A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS.

Dissertation submitted for
M.S. Degree Examination

Branch II - ORTHOPAEDIC SURGERY

DEPARTMENT OF ORTHOPAEDIC SURGERY

MADRAS MEDICAL COLLEGE,

CHENNAI –3

THE TAMILNADU DR .MGR MEDICAL UNIVERSITY

CHENNAI

MARCH - 2013

CERTIFICATE

This is to certify that this dissertation in **"A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS"** is a bonafide work done by **Dr.C. GOUTHAMA BUDDHA** under my guidance during the period 2010 – 2013. This has been submitted in partial fulfillment of the award of **M.S.** Degree in **Orthopedic Surgery (Branch – II)** by the Tamilnadu Dr. M.G.R. Medical University, Chennai.

Prof M.R.RAJASEKAR
DIRECTOR,
INSTITUTE OF ORTHOPAEDICS & TRUAMATOLOGY
MADRAS MEDICAL COLLEGE&
RAJIV GANDHI GOVT GEN. HOSPITAL
CHENNAI – 3.

Prof. A.PANDIASELVAN
PROFESSOR,
INSTITUTE OF ORTHOPAEDICS & TRUAMATOLOGY
MADRAS MEDICAL COLLEGE&
RAJIV GANDHI GOVT GEN. HOSPITAL
CHENNAI – 3.

Prof. V.KANAGASABAI, M.D.,
DEAN
MADRAS MEDICAL COLLEGE&
RAJIV GANDHI GOVT GEN. HOSPITAL
CHENNAI – 3.

DECLARATION

I, **Dr. C.GOUTHAMA BUDDHA,** solemnly declare that the dissertation titled **"A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS"** was done by me at The Rajiv Gandhi Government General Hospital, Chennai – 3, during 2010-2013 under the guidance of my unit chief **Prof. A.PANDIASELVAN, M.S(Ortho), D. Ortho.**

The dissertation is submitted in partial fulfillment of requirement for the award of M.S. Degree (Branch – II) in Orthopaedic Surgery to **The Tamil Nadu Dr. M.G.R. Medical University.**

Place:

Date: **Dr. C.GOUTHAMA BUDDHA**

ACKNOWLEDGEMENT

I express my deepest gratitude to **Prof. Dr. V.KANAGASABAI, M.D.,** Dean, Madras Medical College & Rajiv Gandhi Govt Gen Hospital for providing me an opportunity to conduct this study.

I would like to express my gratitude and reverence to the Director, Institute of Orthopaedics & Traumatology, Madras Medical College & Rajiv Gandhi Government General Hospital, **Prof.Dr.M.R.Rajasekar** M.S.(orth) D.Orth for his invaluable help and guidance.

I express my sincerest gratitude to my unit chief and guide **Prof. Dr. A. Pandiaselvan** M.S.(orth) D.Orth**,** Professor, Institute of Orthopaedics & Traumatology, Madras Medical College & Rajiv Gandhi Govt Gen Hospital whose blessings, support and guidance helped me complete the study.

I express my sincere thanks and gratitude to **Prof. Dr. N.Dheen Muhammed Ismail** M.S.(orth) D.Orth Professor, Institute of Orthopaedics & Traumatology, Madras Medical College & Rajiv

Gandhi Govt Gen Hospital for his constant and guidance provided during the study.

I express my sincere thanks and gratitude to **Prof. Dr. V.Singaravadivelu** M.S.(orth) D.Orth Professor, Institute of Orthopaedics & Traumatology, Madras Medical College & Rajiv Gandhi Govt Gen Hospital for his constant and guidance provided during the study.

I am very much grateful to **Prof. R. SUBBIAH, M**.S.Orth., D.Orth, for his unrestricted help and advice throughout the study period.

I sincerely thank **Prof. NALLI R. UVARAJ** M.S.Orth., D.Orth**.,** for his advice, guidance and unrelenting support during the study.

My sincere thanks to **Prof. Dr. R.H. GOVARDHAN** M.S,Orth., D.Orth., former director, **Prof. S.SUBBAIAH.,** M.S,Orth., D.Orth., and **Prof.V.THULASIRAMAN,** M.S,Orth., D.Orth., Retired professors, Institute Of Orthopaedics and Traumatology, for their valuable advice and guidance

I sincerely thank **Dr. R. SELVARAJ** M.S.Orth., D.Orth., for his advice, guidance and unrelenting support during the study.

I am extremely indebted to my co-**guides Dr. M.ANTONY VIMAL RAJ M.S(Orth) and Dr. S.SENTHIL SAILESH M.S(Orth)** for their constant encouragement, clarifications and guidance provided during the study.

I sincerely thank, Dr.A.Shanmugasundram, Dr.Manimaran K.P, Dr.S.Karunakaran, Dr.R.Prabhakaran, Dr.NalliR.Gopinath, Dr.G.Hemanth Kumar, Dr.P.Kingsly, Dr.J.Pazhani, Dr.Muthukumar Dr.N. Muthazhagan,Dr.M.Mohammed Sameer, Dr.Kannan, Assistant Professors of this department for their valuable suggestions and help during this study.

I thank all anesthesiologists and staff members of the theatre for their endurance during this study.

I am grateful to all my post graduate colleagues for helping in this study. Last but not least, my sincere thanks to all our patients, without whom this study would not have been possible.

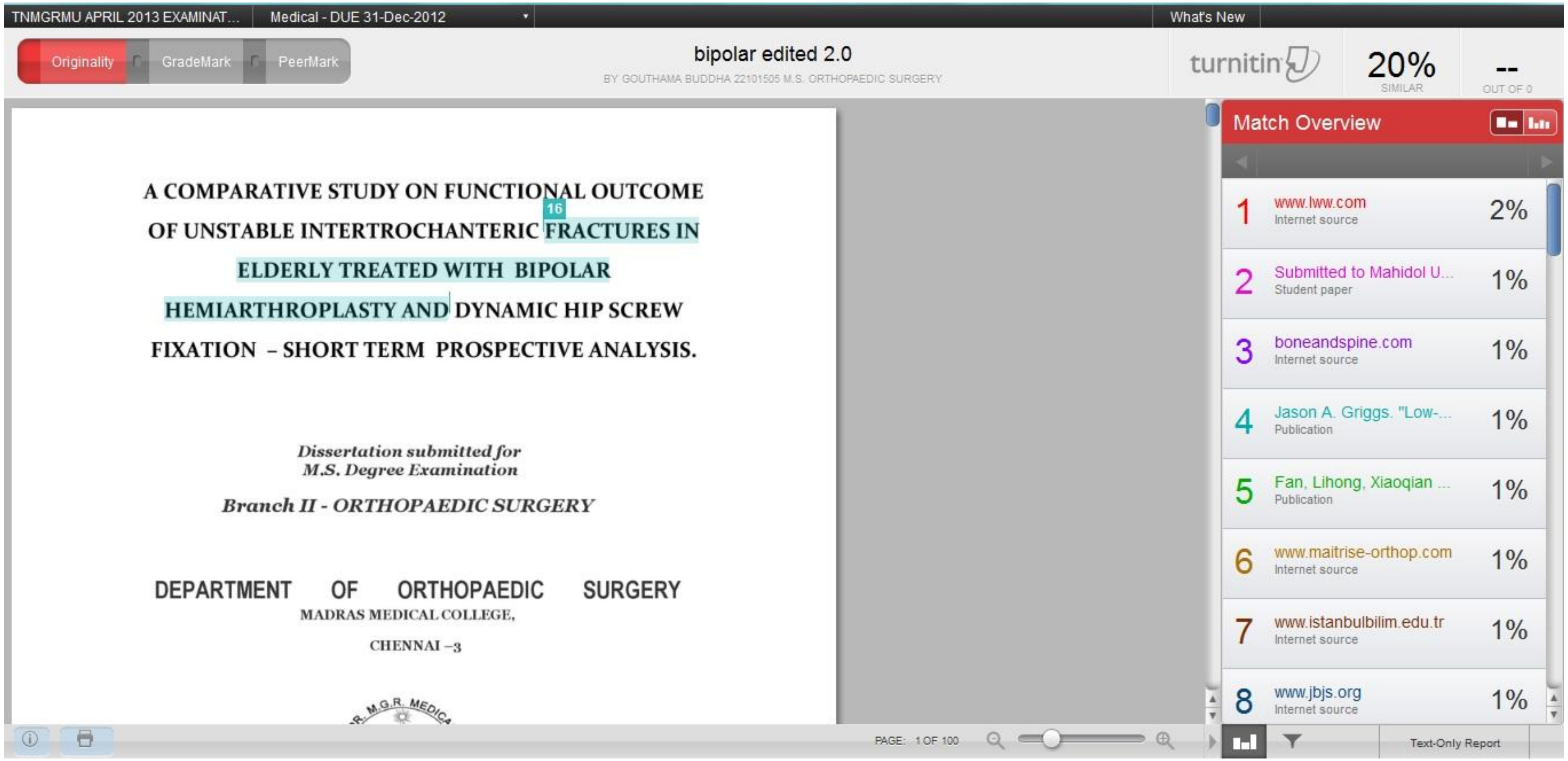
Your digital receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

Paper ID	293566161
Paper title	bipolar edited 2.0
Assignment title	Medical
Author	Gouthama Buddha 22101505 M.S. Orthopaedic Surgery
E-mail	gbudh.85@gmail.com
Submission time	22-Dec-2012 11:12PM
Total words	8743

First 100 words of your submission

A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS. Dissertation submitted for M.S. Degree Examination Branch II - ORTHOPAEDIC SURGERY DEPARTMENT OF ORTHOPAEDIC SURGERY MADRAS MEDICAL COLLEGE, CHENNAI –3 THE TAMILNADU DR .MGR MEDICAL UNIVERSITY CHENNAI MARCH - 2013 CERTIFICATE This is to certify that this dissertation in “A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS” is a bonafide work done by Dr.C....


TNMGRMU APRIL 2013 EXAMINAT...
Medical - DUE 31-Dec-2012
What's New
Originality
GradeMark
PeerMark
bipolar edited 2.0
BY GOUTHAMA BUDDHA 22101505 M.S. ORTHOPAEDIC SURGERY
turnitin
20%
SIMILAR
--
OUT OF 0
A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS.
16
Dissertation submitted for
M.S. Degree Examination
Branch II - ORTHOPAEDIC SURGERY
DEPARTMENT OF ORTHOPAEDIC SURGERY
MADRAS MEDICAL COLLEGE,
CHENNAI –3
Match Overview
1 www.lww.com Internet source 2%
2 Submitted to Mahidol U... Student paper 1%
3 boneandspine.com Internet source 1%
4 Jason A. Griggs. "Low-... Publication 1%
5 Fan, Lihong, Xiaoqian ... Publication 1%
6 www.maitrise-orthop.com Internet source 1%
7 www.istanbulbilim.edu.tr Internet source 1%
8 www.jbjs.org Internet source 1%
PAGE: 1 OF 100
Text-Only Report

Gouthama Buddha 22101505 M.S. Orthopaedic Surgery | User Info | Messages | Student ▼ | English ▼ | What's New | Help | Logout

turnitin

Class Portfolio | Peer Review | My Grades | Discussion | Calendar

NOW VIEWING: HOME > TNMGRMU APRIL 2013 EXAMINATIONS

Welcome to your new class homepage! From the class homepage you can see all your assignments for your class, view additional assignment information, submit your work, and access feedback for your papers.

Hover on any item in the class homepage for more information.

Class Homepage

This is your class homepage. To submit to an assignment click on the "Submit" button to the right of the assignment name. If the Submit button is grayed out, no submissions can be made to the assignment. If resubmissions are allowed the submit button will read "Resubmit" after you make your first submission to the assignment. To view the paper you have submitted, click the "View" button. Once the assignment's post date has passed, you will also be able to view the feedback left on your paper by clicking the "View" button.

Assignment Inbox: TNMGRMU APRIL 2013 EXAMINATIONS

	Info	Dates	Similarity	
Medical	ⓘ	Start 21-Nov-2012 11:24AM Due 31-Dec-2012 11:59PM Post 07-Jan-2013 12:00AM	20%	Resubmit · View
Dental	ⓘ	Start 27-Nov-2012 12:43PM Due 31-Dec-2012 11:59PM Post 07-Jan-2013 12:00AM		Submit · View

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. C. Gouthama Buddha. C
PG in MS Orthopaedics
Madras Medical College, Chennai -3

Dear Dr. C. Gouthama Buddha. C

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "A Prospective study on functional outcome of unstable intertrochanteric fractures in elderly treated with bipolar hemiarthroplasty and dynamic hip screw fixation " No.11092012.

The following members of Ethics Committee were present in the meeting held on 13.09.2012 conducted at Madras Medical College, Chennai -3.

1.	Dr. S.K. Rajan. M.D.,FRCP.,DSc	-- Chairperson
2.	Prof. Pregna B. Dolia MD Vice Principal, Madras Medical College, Chennai -3 Director , Institute of Biochemistry, MMC, Ch-3	-- Member Secretary
3.	Prof. B. Vasanthi MD Professor of Pharmacology ,MMC, Ch-3	-- Member
4.	Prof. M. Reghu MD Director, Inst. Of Internal Medicine, MMC, Ch-3	-- Member
5.	Prof. MD. Ali. MD.DM Prof & HOD of MGE, MMC, Ch-3	-- Member
6.	Prof. P. Karkuzhali. MD Director i/c, Prof., Inst. of Pathology, MMC, Ch-3	-- Member
7.	Prof. Bavani Shankar. MS Prof of General Surgery, MMC, Ch-3	-- Member
8.	Thiru. S. Govindsamy. BABL	-- Lawyer
9.	Tmt. Arnold Soulina MA MSW	-- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

CONTENTS

INTRODUCTION

INTRODUCTION

Proximal femoral fractures in elderly individuals have a tremendous impact on both the health care system and society and it occurs in moderate or minimal trauma[1][2]. During an impact the large amount of energy that is released is absorbed by the skin, fat, and muscles which surrounds the hip. There is an increased incidence of hip fractures with aging due to decrease in muscle mass around the hip[2] and osteoporosis and is becoming more common as the proportion of elderly people in the population increases[3].

Trochanteric hip fractures in elderly patients have benefited from advances in internal fixation. Early failure of internal fixation occurs however in a number of cases[4]. The failure after internal fixation had been due to initial fracture pattern, communition, sub optimal fracture fixation and poor bone quality[5]. The problems associated with fixation of these fractures are loss of fixation, varus collapse and cut out of the lag screw[6] ,as a result there is profound functional disability and pain[7]. In these patients treatment with primary bipolar hemiarthroplasty decreases the post operative complications due to prolonged immobilization or implant failureand also quickly return the patients to their preinjury activity level{6,8}.

The purpose of our study was to evaluate the results and functional outcome of bipolar hemiarthroplasty and dynamic hip screw fixation for communited, osteoporotic trochanteric fractures of the elderly.

AIM OF THE STUDY

AIM

The aim of this Prospective comparative study is to analyse the short term follow up results of unstable Intertrochanteric fractures in elderly treated with Bipolar hemiarthroplasty and Dynamic hip screw fixation done in our institution from May 2010 to December 2012

REVIEW OF LITERATURE

HISTORICAL REVIEW

Ashley Cooper recognized fractures in the proximal femur distal to the insertion of capsule. They invariably united without difficulty often with external rotation and shortening leading to coxa vara. Till the 1940s the standard treatment was reduction of the fracture and immobilization in plaster spica or in traction. The long period of immobility required for this treatment carried considerable morbidity, particularly in elderly patients. In addition to problems of prolonged bed rest, reports about various management strategies were not satisfactory.

The justification for early rehabilitation in this group was accurately summed up by this quotation by Evans. ''*The very old patients who sustain this injury tolerate pain and immobility badly; their mental state is often precarious and is quick to develop bed sores or pulmonary complications. We believe that they should be treated as surgical emergency and the older and more feebler the patient the more urgent is the need for the operation.*"

Evolution of treatment:

1878	Langeneck and Koenigs first performed open reduction and internal fixation using a nail for fixation of the hip fractures.
1881	Senn was the first to publish an account on the use of a screw for internal fixation.
1900	David used ordinary wood screw.
1925	Smith Petersen reported an account on use of triflanged nailing.
1932	Johannsenn introduced a cannulated triflanged nail
1937	Thornton devised plate attachment for the triflanged nail
1941	Jewett pioneered a one-piece implant by adding a solid plate to the triflanged cannulated nail.
1944	Austin and Moore introduced a blade and plate, also advocated the use Multiple pins which prevented rotations and supported the proximal fragment in all quadrants.
1947	Mc Laughlin designed a variable angled nail plate which

	was string and did not require bending of the plate to change the angle while attaching to the smith peterson nail.
1955	Schumpelick and Jantzan described a sliding screw, the design of which they attributed to Ernest Pohl.
1964	Clawson reported the use of a sliding screw and plate. The device was manufactured independently by Richard's manufacturing co.
1967	Zickel described a new Y shaped device which combined an intramedullary nail with a triflanged nail and was passed into neck and head.
1974	Tronzo reported satisfactory results using a Matchett – Brown endoprosthesis{10}.
1977	Stern and Goldstein reported use of Lein bach prosthesis{11}.
1978	Ender described a closed method of passing flexing nails retrograde in to the neck.
1980	Harris described closed condylocephalic nailing
1987	Green S, reported satisfactory results with Bipolar prosthesis{8}.

1990	win SF, reported satisfactory results with LeinbachBipolar prosthetis{13}.
2000	Chan, K. Casey MD; reported the use of Cemented hemiarthroplasties .
2003	Haidukewych GJ, reported Hip arthroplasty for salvage of failed treatment of intertrochanteric hip fractures{14}.
2004	James P. Waddel, reported the role of total hip replacement {9}.
2005	n Yoon Kim MD, reported Cementless calcar replacement hemiarthroplasty compared with intramedullary fixation of unstable intertrochanteric fractures{12}.
2005	Grimmsrud C, reported on Cemented hip arthroplasty with a novel circlage cable technique for unstable intertrochanteric hip fractures{15}.
2007	Jean-Michel Laffosse reported onCementless modular hip arthroplasty as a salvage operation for failed internal fixation of trochanteric fractures in elderly patients{16}.
2009	Parvjeet Singh Gulati, Rakesh Sharma reported a Comparative study of treatment of intertrochanteric fractures of femur with long-stem bipolar prosthetic replacement versus dynamic hip screw fixation[17}.

2010	Sinno K, Sakr M, Girard J, Khatib H. reported on the effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients[18].
2010	KH Sancheti, PK Sancheti reported functional outcome of primary hemiarthroplasty for unstable intertrochanteric fractures in elderly[19].

ANATOMY

The proximal femur *(fig 1)*includes the head, neck, lesser and greater trochanters, and proximal femoral diaphysis .The adult neck-shaft angle averages 125 degrees (106 to 155 degrees).the angle of femoral torsion is about 15 degrees and is formed by the upper and lower ends of femur.

The area between the greater and lesser trochanter is the intertrochanteric region which is characterized by dense trabecular bone (*fig 2*).Similar to the cancellous bone of the femoral neck this region also transmit and distribute stress.

The major muscles of the gluteal region (illio psoas,gluteus maximus, medius and minimus and short external rotators) gets inserted in the greater and lesser trochanters.

Calcar femorale (*fig 3,fig 4*) : it is a thin vertical wall of dense bone ,extends from the posteromedial aspect of the femoral shaft to the posterior portion of the femoral neck . It acts as a strong conduit for stress transfer

MUSCULATURE OF HIP :

ABDUCTORS :

The chief muscles producing this movement are gluteus maximus, gluteus medius and gluteus minimus .These are fan shaped muscles which originates from gluteal surface of Ilium, iliac crest and inserts on to the greater trochanter and iliotibial band ,linea aspera.

The accessory muscles are tensor fasciae latae and Sartorius.

INTERNAL ROTATORS OF HIP :

The chief muscles are anterior fibres of gluteus medius and gluteus minimus and tensor fascia latae.(lies between gluteal region and the front of thigh)

The tensor fascia latae originates from anterior 5 cm of outer lip of iliac crest and also from anterior superior iliac spine and gets inserted in to iliotibial tract.

HIP FLEXORS :

The chief muscles are Psoas major and iliacus.

They are located in the anterior aspect of the thigh. The iliopsoas gets inserted onto the lesser trochanter.

The accessory muscles are Pectin us, rectus femora's and Sartorius

ADDUCTORS :

The chief muscles producing this movement are adductor longus, brevis and magnus. These muscles have their origin from pubis and get inserted on to linea aspera.

The accessory muscles are pectineus and gracilis.

EXERNAL ROTATORS :

The chief muscles are two obturators (internus and externus),two gemelli (superior and inferior)and the quadrates femoris.

These muscles get inserted onto the posterior portion of the greater trochanter.

The accessory muscles are pectineus,Sartorius and gluteus maximus.

HIP EXTENSION:

The chief muscles are gluteus maximus and hamstrings (semitendinosus,semimembranosus and biceps femoris). These have their origin from ischium and get inserted on the tibia.

The gluteus maximus originates from sacrum coccyx and Ilium; it gets inserted onto the gluteal tuberosity along the linea aspera and the iliotibial tract, serves as an extensor and external rotator of the hip.

LIGAMENTS OF HIP JOINT :

The ligaments are :

- The fibrous capsule
- The illiofemoral ligament
- The pubofemoral ligament
- The ischiofemoral ligament
- The ligament of the head of femur
- The acetabular labrum
- The transverse acetabular ligament.

BLOOD SUPPLY :

Hip joint is supplied by obturator artery,medial and lateral circumflex femoral artery,superior and inferior gluteal arteries.

NERVE SUPPLY :

It is supplied by the femoral nerve,the anterior division of obturator nerve,accessory obturator nerve,nerve to quadrates femoris and superior gluteal nerve.

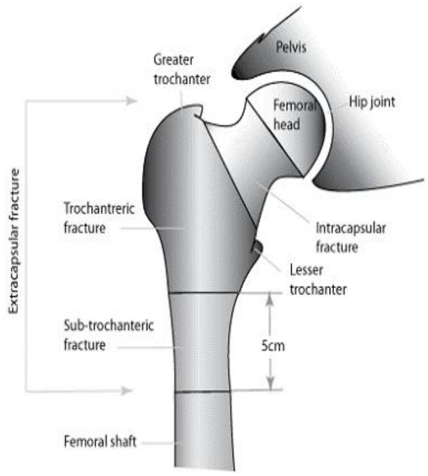


Fig 1

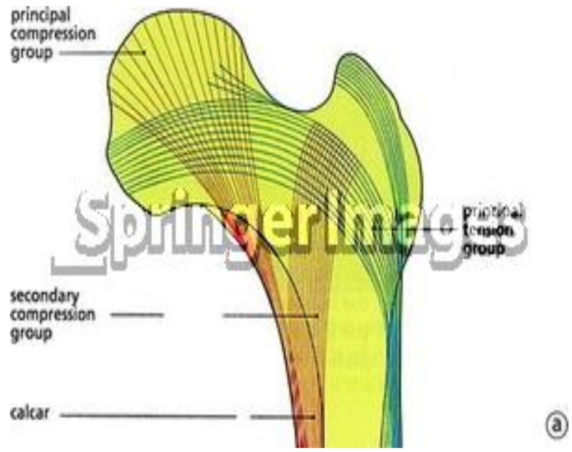


Fig 2

Fig 3

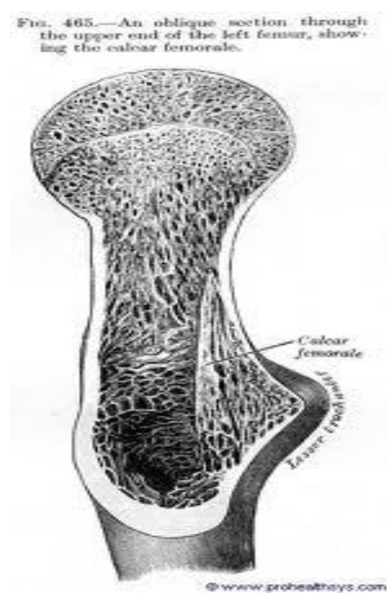
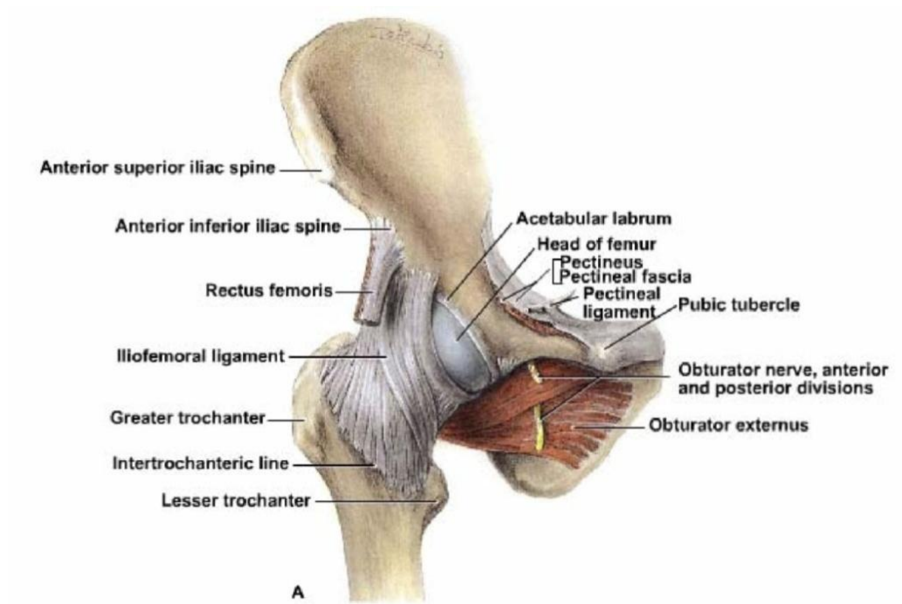
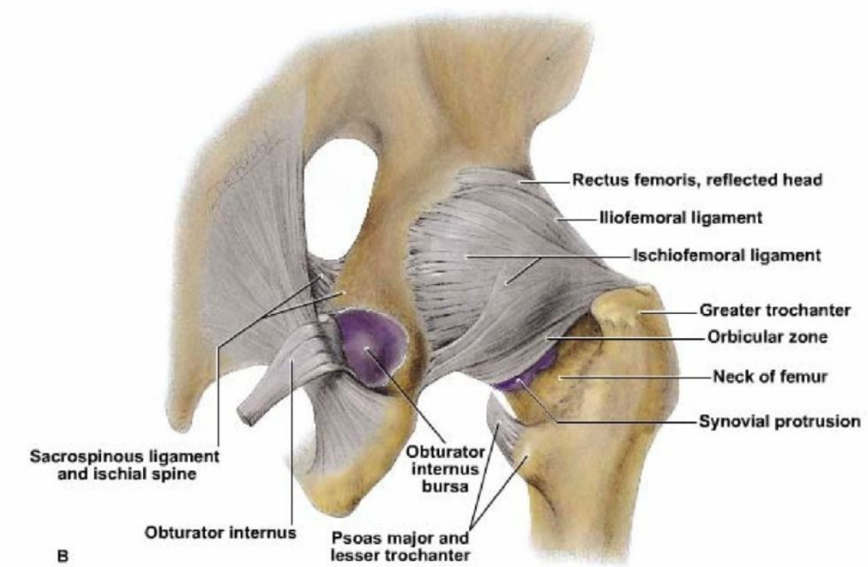


Fig 4

Anatomy of hip joint





BIOMECHANICS

BIOMECHANICS OF THE NORMAL AND REPLACED HIP JOINT:

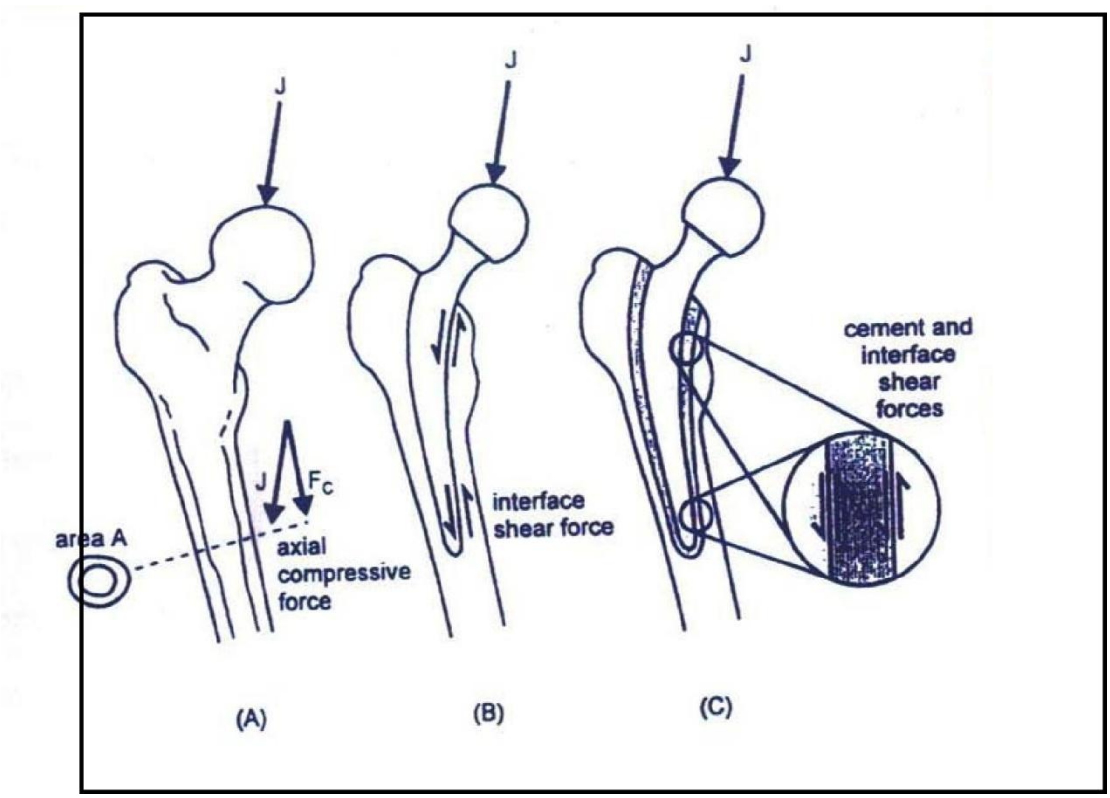
Bone is a living tissue. The structural properties and shape changes according the load acting on it. The load transfer mechanisms in normal and replacement hips are quite different. The stresses generated are axial, bending and torsional loads in the femur and femoral stem and for compressive loads in the acetabulum. In practice, all methods of calculating stresses are only estimate ,because the material properties of bone and the bone - implant interface properties are variable and cannot be determined accurately.

FORCES ACTING ON THE HIP:

The body weight can be depicted as a load applied to a lever arm extending from the body’s center of gravity to the center of the femoral head [1].

The abductor musculature, acting on a lever arm extending from the lateral aspect of the greater trochanter to the center of the femoral head, must exert an equal moment to hold the pelvis level when in a one-legged stance, and a greater moment to tilt the pelvis to the same side when walking or running.

When lifting, running, or jumping, the load may be equivalent to 10 times the body weight. Therefore excess body weight and increased physical activity add significantly to the forces that act to loosen, bend, or break the stem of a femoral component.



SHEAR FORCES AT BONE-STEM AND BONE-CEMENT-STEM INTERFACE:

The body's center of gravity (in the midline anterior to the second sacral vertebral body) is posterior to the axis of the joint, hence the forces on the joint act not only in the coronal plane, they also act in the sagittal plane to bend the stem posteriorly. Such forces cause posterior deflection or retroversion of the femoral component.

Rotational stability of the stem can be increased both proximally and distally by increasing the width of the proximal portion of the stem to better fill the metaphysis of the femoral component.

Modifications of the distal portion of the stem may add to rotational stability as well. Longitudinal cutting flutes and extensive porous coatings that "scratch" the diaphyseal endosteum improve rotational stability in the absence of cement.

COMPRESSIVE STRESSES IN THE FEMUR:

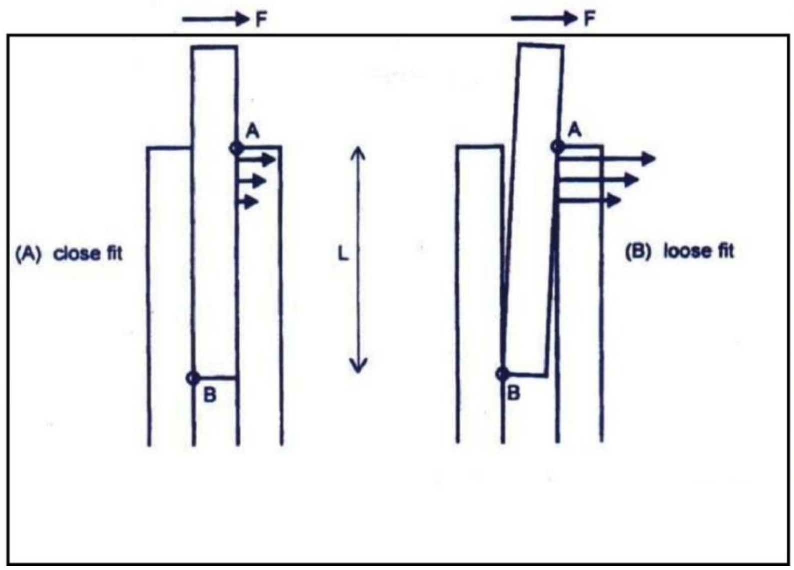
The highest moments occur in the coronal plane. However, there are also moments acting in the sagittal and transverse planes. The compressive joint force is transferred from the stem to the femur as a shear force, passing directly from the stem to the bone in a cementless prosthesis, or via the cement layer in cemented prosthesis, causing shear stresses in the cement. If the stem-bone bond or stem-cement-bone bond is not sufficiently strong, the prosthesis will loosen and sink down the medullary cavity. The compressive stresses in the stem itself can be found by dividing the compressive load taken by the stem at any section along its length by the area of that cross section.

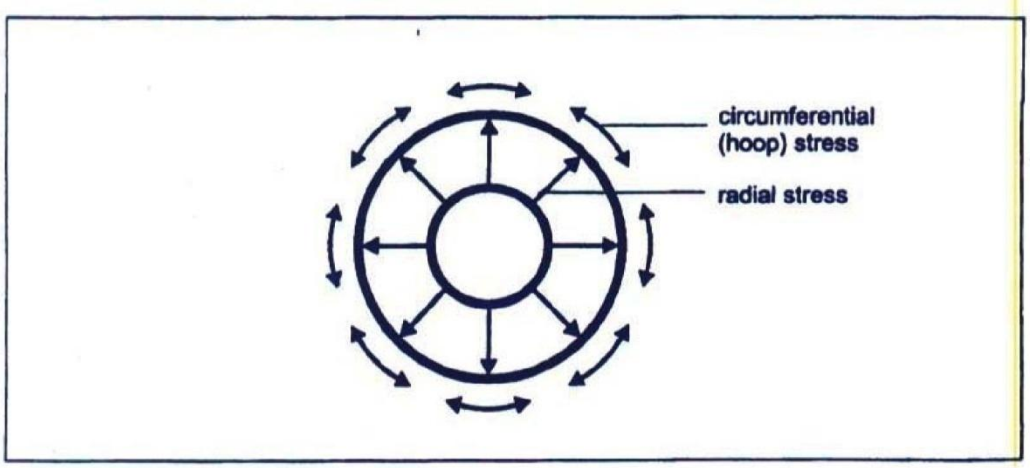
BENDING STRESSES IN THE FEMUR:

The joint force acting on the normal hip produces not only a compressive stress but also a bending stress in the femur. The bending stress is caused because the direction of the joint force vector is not along the neutral axis so the femur provides one main contact point and the lateral distal side provides another, which counteracts the tendency for the stem to rotate due to the bending action of the joint force. The main likelihood of stem failure is if it loosens proximally in which cases the bending moment at the distal end increase drastically and failure can occur.

HOOP STRESSES DUE TO BENDING:

Radial and circumferential (hoop) stresses are also generated under the action of a bending load. Radial stresses (stresses that are directed radially outward from a central point) are greatest at the points of bone - stem contact at the proximal and distal ends and are less in between proportionate to the square of the length of contact of the stem with these radial stresses in turn cause hoop stresses in the bone which are primarily tensile stresses that act in a direction that tends to split the bone. These stresses cause tensile hoop stresses around the circumference. In figure the stem has a loose fit in the bone giving rise to very high local stresses a and b, causing hoop stresses that are high enough to fracture the bone. It has been shown that the radial stresses are inversely the bone. This means that stems of short length are prone to cause high radial stresses on the bone.





DIRECTION OF RADIAL AND TENSILE HOOP STRESSESS
IN A HOLLOW CIRCULAR STRUCTURE

STRESSES IN THE ACETABULUM:

The acetabulum is subjected to a compressive load, the joint force, which manifests as a compressive stress. The normal acetabulum has a slightly larger diameter than the head of the femur, which has an approximately spherical surface. From a structural point of view, it can be considered to be a sandwich of cancellous bone between two layers of cortical bone - one covered with articular cartilage forming the joint bearing surface. This structural sandwich forms a lightweight structure with good rigidity under a bending load. Under the compressive joint loading caused by the femoral head pressing into the acetabulum, the cortical shells are highly stressed and broken, which means that the cancellous bone, which is normally not highly stressed, has to take the load passed to it from prosthesis

CLASSIFICATION AND ASSESSMENT

There are many classifications to assess and understand the intertrochanteric fractures of femur.

EVAN'S CLASSIFICATION

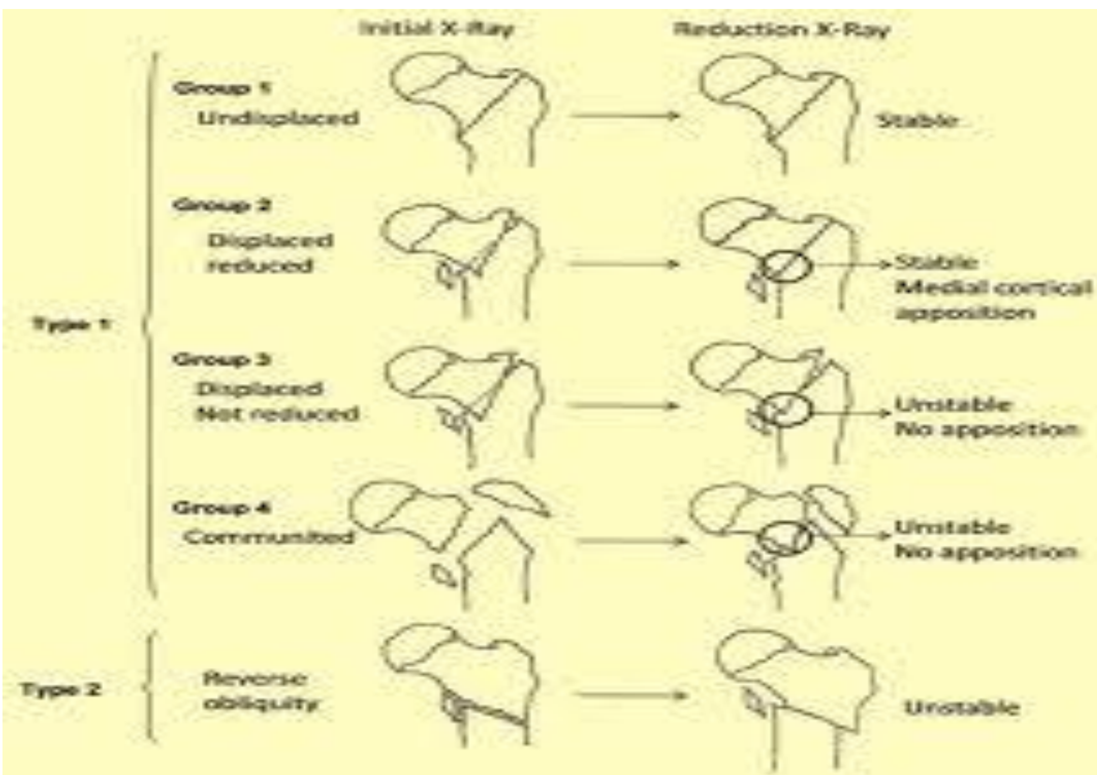


Fig 5

Evan’s divided the fractures into stable and unstable types.

Unstable types are further divided into two types:

1} anatomical or near anatomical reduction restoring stability and

2} stability could not be achieved

TYPE 1: undisplaced 2 fragment fracture

STABLE

Group I Fracture in which inner cortical buttress has been undisturbed (65%).

- No displacement.
- Fractures become stable.

Group II Fracture in which there in simple overlapping of inner cortical buttress (7%).

- Can be reduced by manipulation.
- Fracture becomes stable.

UNSTABLE

Group III This group includes those fractures in which the overlapping remains unreduced (14%).

- Cannot be reduced by manipulation.
- Unstable fracture.
- Coxavara to be expected.

Group IV This group includes comminuted fractures (6%).

- Cannot be reduced.
- Unstable fracture.
- Coxavara to be expected.

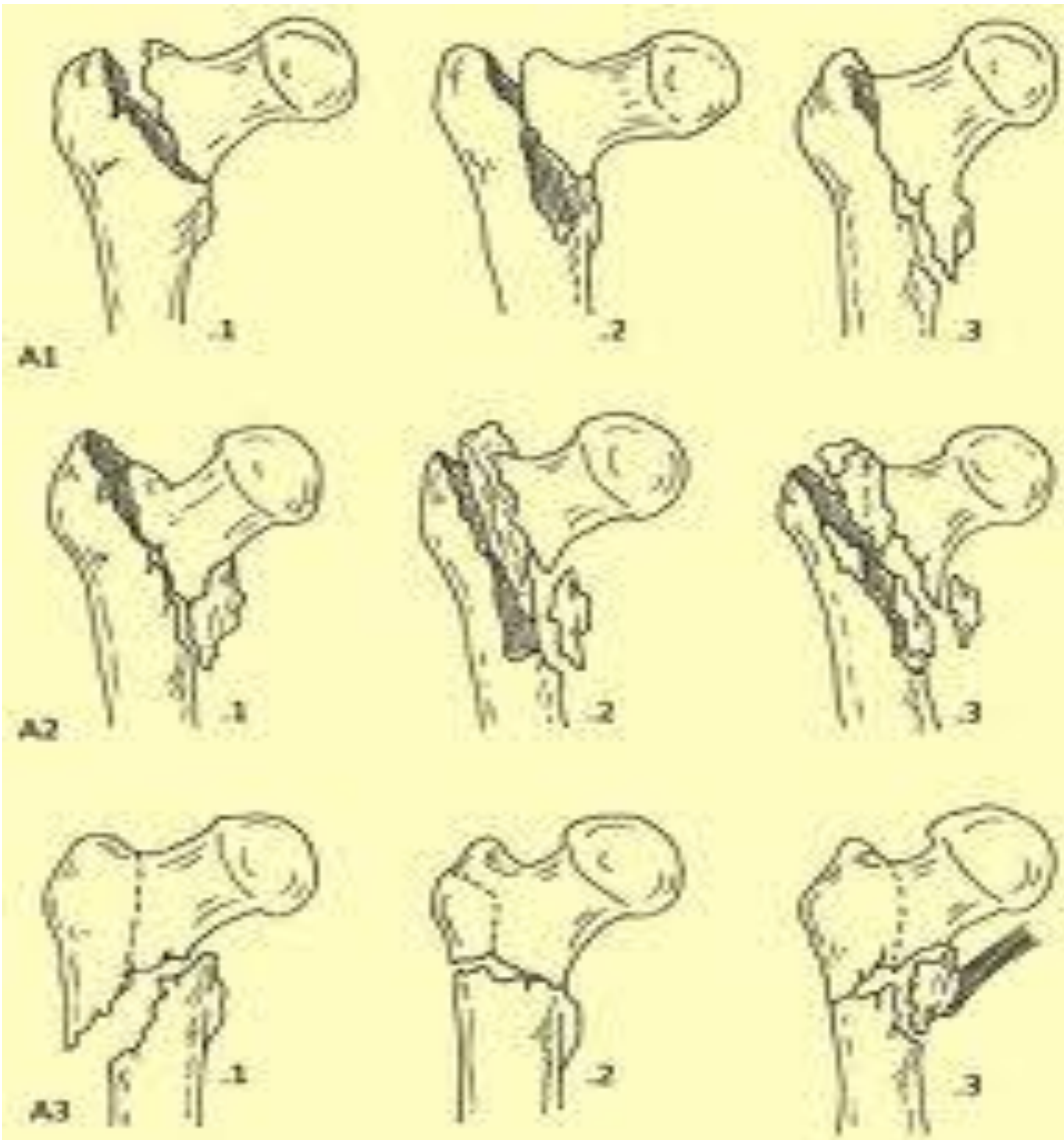
TYPE 2 :

Reverse oblique fracture. retety

The femoral shaft is medially displaced due to pull of adductor nuscles

- Unstable fractures

AO – OTA :



A1. Simple (2-fragment) pertrochanteric area fractures:

A1.1 Fractures along the intertrochanteric line;

A1.2 Fractures through the greater trochanter;

A1.3 Fractures below the lesser trochanter;

A2. Multifragmentary pertrochanteric fractures;

A2.1 With one intermediate fragment (lesser trochanter detachment);

A2.2 With 2 intermediate fragments;

A2.3 With more than 2 intermediate fragments;

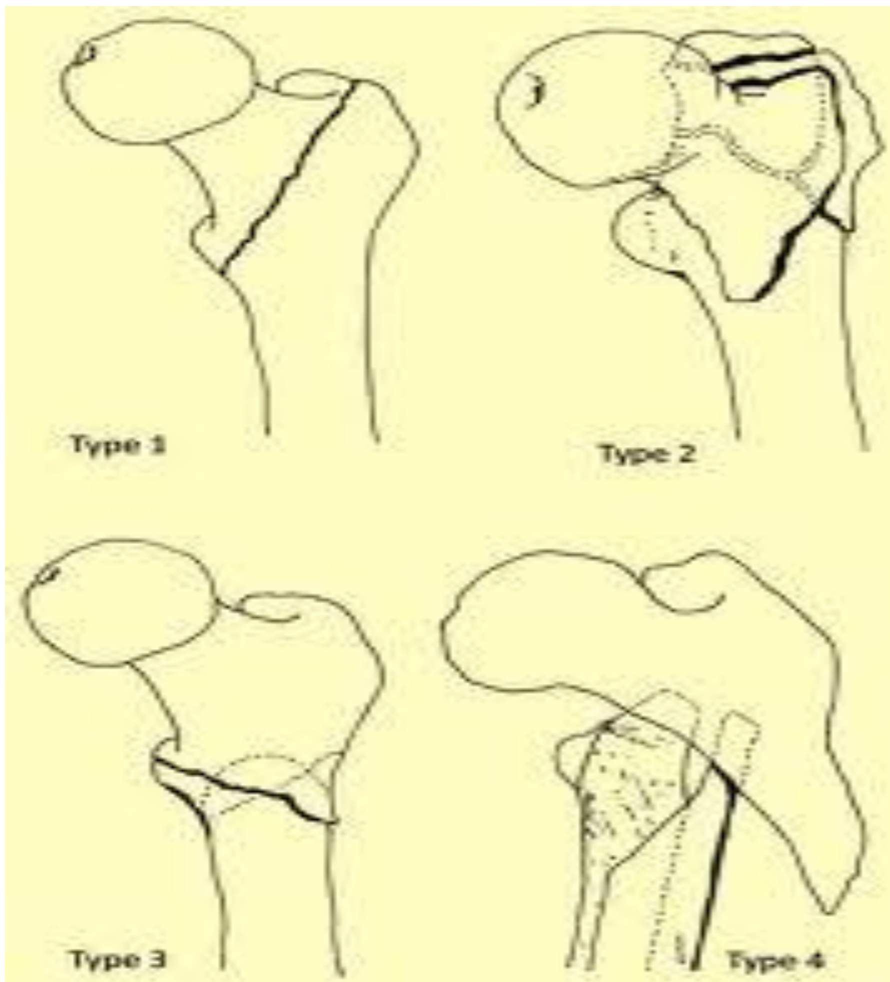
A3. Intertrochanteric fractures;

A3.1 Simple, oblique;

A3.2 Simple, transverse;

A3.3 With a medial fragment

BOYD H.P. AND GRIFFIN L.L. :



Type 1:

Fracture line extends from greater trochanter to lesser trochanter along the intertrochanteric line.

Type 2:

Comminuted fractures, the main fracture passes along the intertrochanteric line ,associated with multiple fractures in the cortex

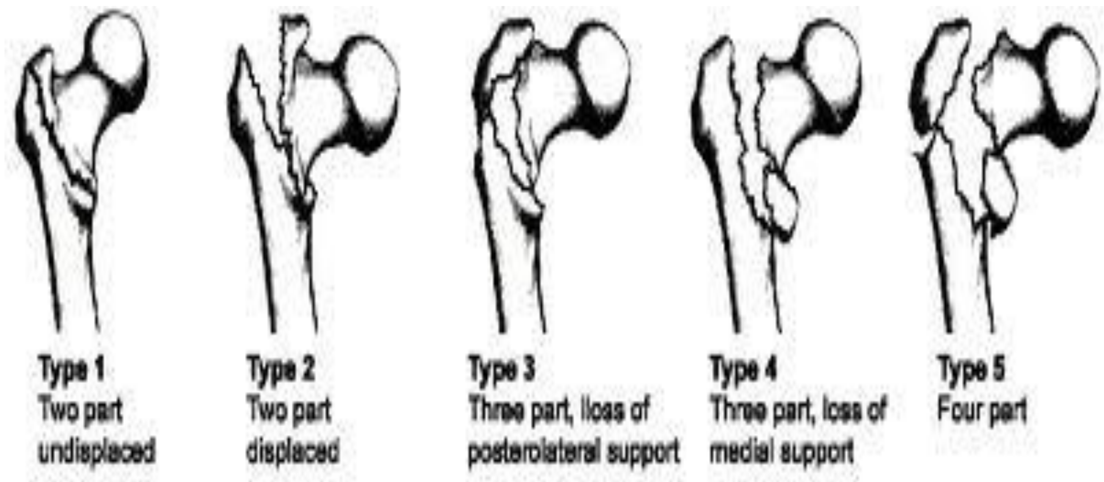
Type 3 :

In this type it is the fracture is subtrochanteric with a fracture line passing across the proximal fragment (i.e.) the part including greater trochanter and lesser trochanter.

Type 4:

In this type fracture occurs in two planes with fractures of proximal shaft and trochanteric region.

JENSEN AND MICHALSEN CLASSIFICATION :



STABLE :

Type 1 2 part fracture – undisplaced
Type 2 2 part fracture - displaced

UNSTABLE

Type 3 Three part where greater trochanter is 3rd part, loss of medial support.

Type 4 Three part fracture where lesser trochanter is the 3rd part, loss of medial support.

Type 5 Four part fracture involves both lesser and greater trochanter loss of medial and posterolateral support.

TRONZO'S CLASSIFICATION (1973)

Tronzo classified the trochanteric fractures into 5 types.

Type I Incomplete trochanteric fractures-Anatomical reduction is achieved with traction.

Type II Non comminuted fractures with or without displacement in which both trochanter are fractured. They are reduced with traction. Anatomic reduction is usually achieved.

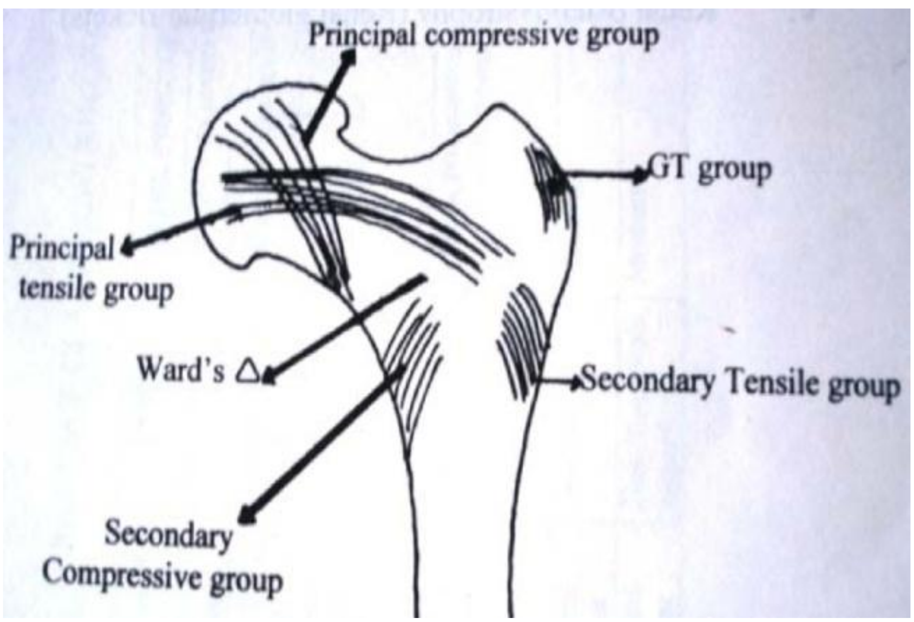
Type III Comminuted fractures in which lesser trochanter fragment is larger. The posterior wall is exploded, beak of inferior neck already displaced into medullary canal of the shaft fragment. These are so called unstable fractures. A variant of type III is also fracture and separation of greater trochanter.

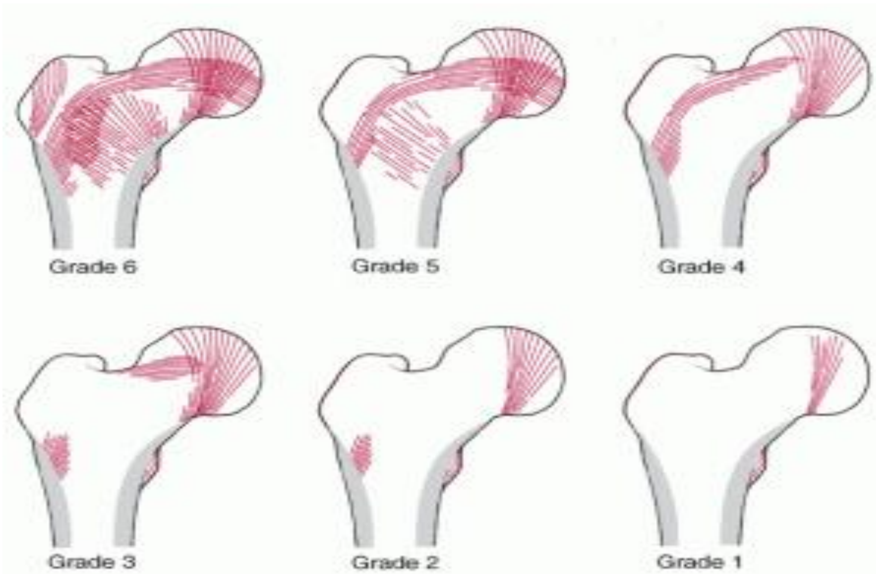
Type IV Comminuted trochanteric fractures with disengagement of two main fragments. Again these are unstable with posterior wall exploded with the spike of the neck fragments displaced outside of or medial to the shaft.

Type V Trochanteric fractures with reverse obliquity. These are unstable.

SINGH'S INDEX FOR ASSESSMENT OF OSTEOPOROSIS :

Singh's Index is a method of grading the severity of osteoporosis and is estimated by studying the trabeculae within the proximal femur.





Grade 1: There is reduction in principal compressive trabeculae. .

Grade 2: prominence of principal compressive trabeculae

Grade 3: Several things are observed. There is a break in the continuity of the bone tensile.

Grade 4: there is reduction in the principal tensile trabeculae.

Grade 5: The principal tensile trabecule or trabeculae is accentuated.

Grade 6: Radiograph shows the presence of all trabecular groups.

Grade 3 to 1 represent osteoporosis.

MATERIALS AND METHODS

MATERIALS AND METHODS

This study was conducted at Rajiv Gandhi Government General Hospital and Madras Medical college from May 2010 to December 2012 on 42 elderly osteoporotic patients with unstable inter trochanteric fractures who were divided in to two groups with Group A - bipolar prosthesis (21 cases) and Group B – DHS (21 cases).

Inclusion criteria:

1. Age more than 60 years
2. Unstable intertrochanteric fractures (AO-ATO & EVANS classification)
3. Osteoporotic fractures

Exclusion criteria:

1. Age less than 60 years
2. Patients with stable intertrochanteric fractures(AO-ATO & EVANS classification)
3. Patients with pathological fractures
4. Patients with stable lesser trochanter
5. Patients with associated fractures of lower limbs

CLASSIFICATION:

Fractures were classified based on AO and Evans classification.

PRE OPERATIVE EVALUATION:

The general condition of the patient is assessed at the time of admission and associated co morbidities are noted .skeletal traction was applied for applied for patients who had delay in getting anaesthetic fitness.

RADIOGRAPHIC EVALUATION:

Both anteroposterior and lateral radiographs were taken and studied

.

FUNCTIONAL ANALYSIS:

The functional outcome was evaluated using Harris hip score during follow up.

STATISTICAL ANALYSIS:

Data are reported as mean and significant difference between the two groups data was studied using Two-sample Wilcoxon rank-sum (Mann-Whitney) test

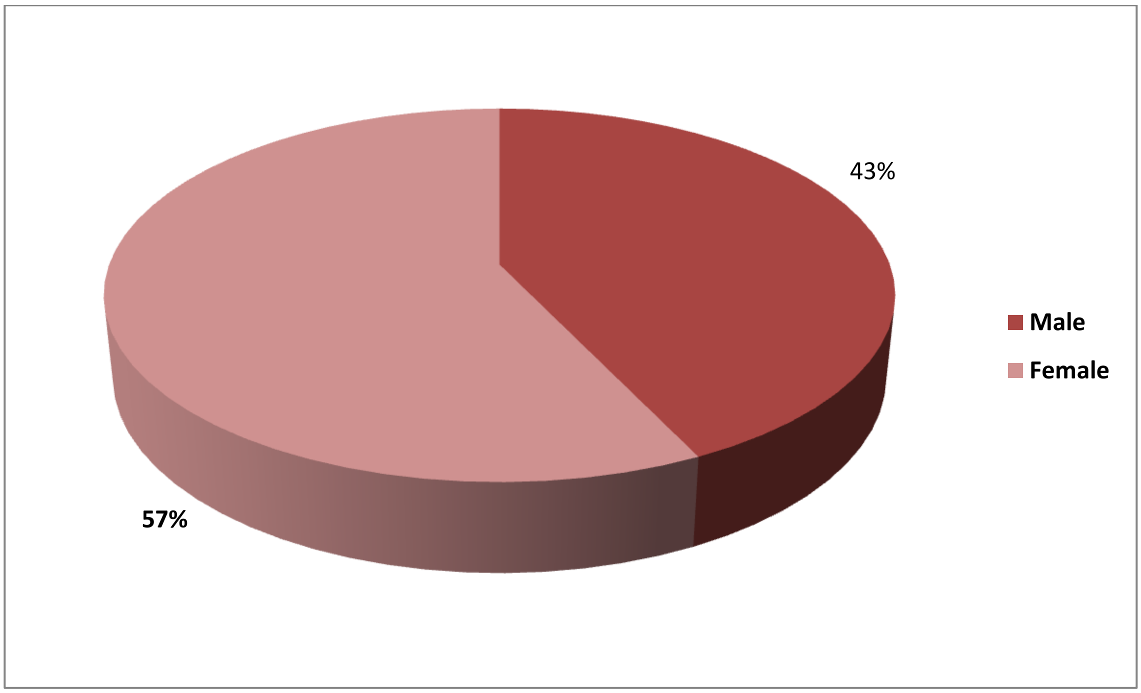
AGE AND SEX DISTRIBUTION :

AGE	GROUP A sex		GROUP B sex		TOTAL
	M	F	M	F	
60 – 69	04	5	7	5	21
70 – 79	3	5	2	5	15
80 – 89	1	2	1	1	5
90 - 99	1	-	-	-	1
TOTAL	9	12	10	11	42

In our study, of the total 42 participated , most of them were in the age group of 60 – 69 (50%). Females outnumbered males in both the groups,57% in group A and 52% in group B

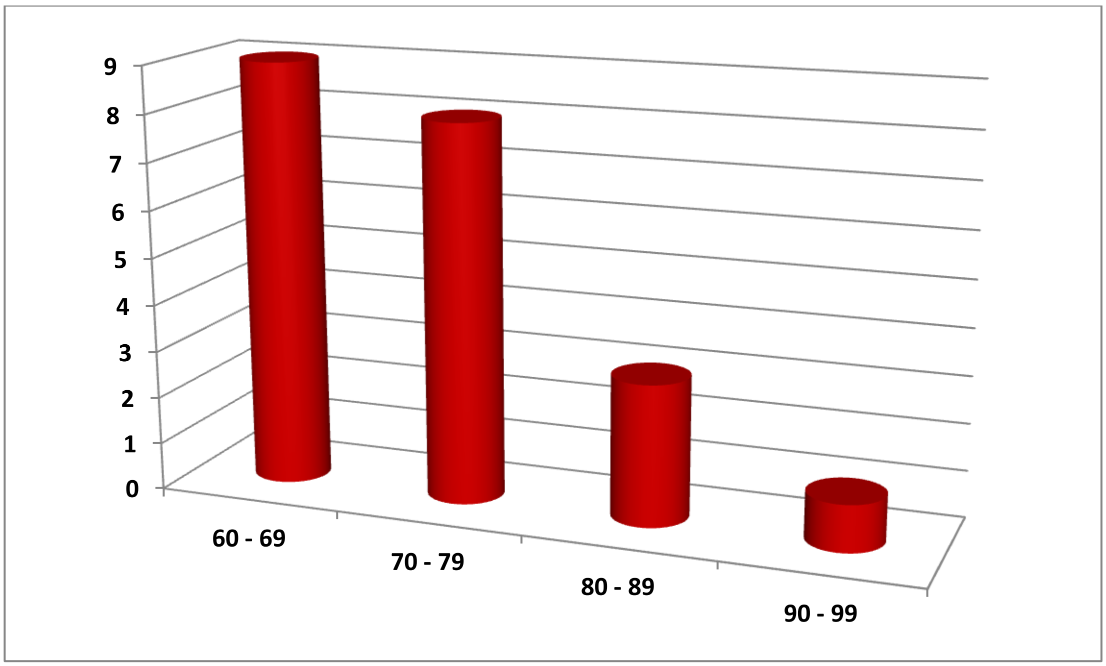
Group A :

SEX DISTRIBUTION



Among 21 patients , there were 12 female (57%) and 9 male (43 %) patients .

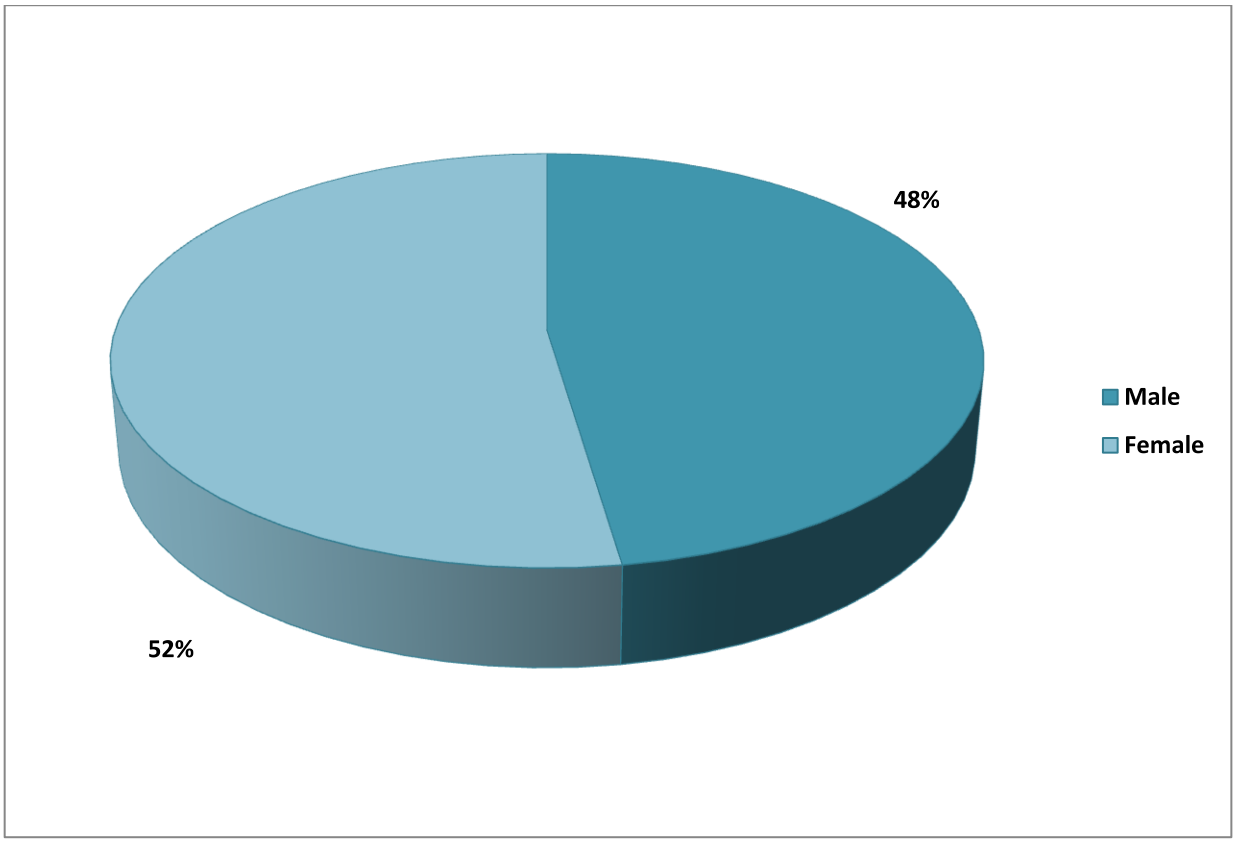
AGE DISTRIBUTION



- Nine patients were in the age group of 60 – 69 , of this 4 male and 5 female patients.
- Eight patients in age group of 70 – 79 , of this 3 male and five female patients.
- Three patients in the age group of 80 – 89 ,of this 1 male and 2 female patients.
- There was one patient in the age group of 90 – 99

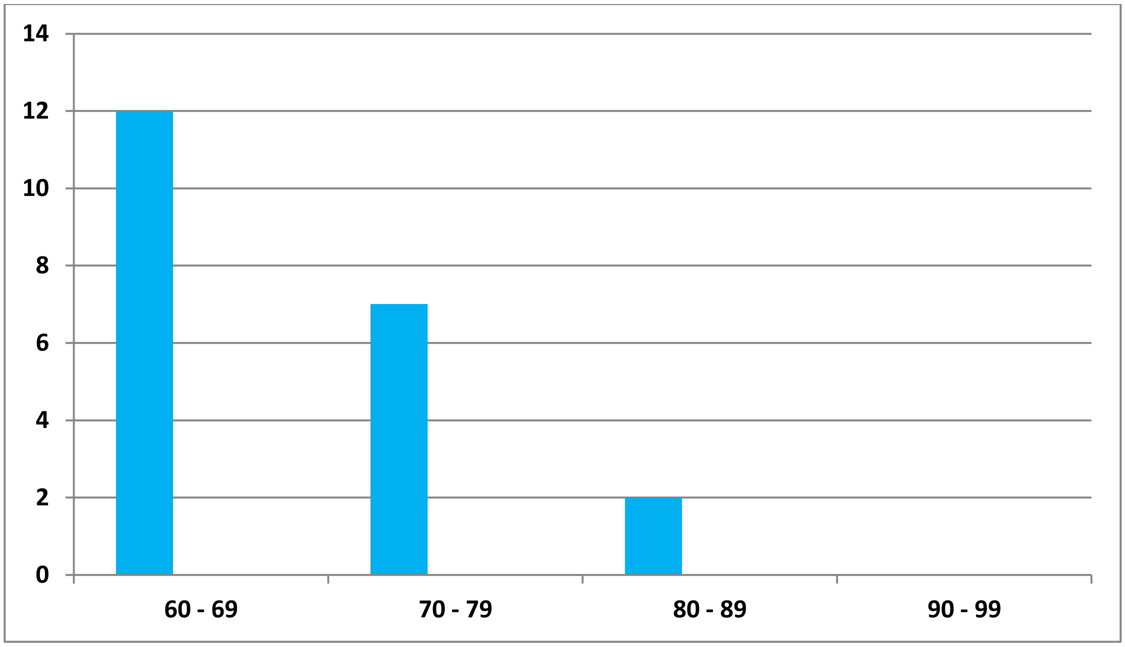
Group B:

SEX DISTRIBUTION:



Among 21 patients there were 10 male (48 %) and 11 female (52 %) patients.

AGE DISTRIBUTION



- Twelve patients were in the age group of 60 – 69 , of this 7 male and 5 female patients.
- Seven patients in age group of 70 – 79 , of this 2 male and five female patients.
- Two patients in the age group of 80 – 89 ,of this 1 male and 1 female patients.

SIDE INVOLVED:

GROUP A

Side	No of patients
Right	11
Left	10

Of the 21 patients in group A,11 patients had fracture on right side and 10 patients on left side.

GROUP B

Side	No of patients
Right	12
Left	9

Of the 21 patients in group B,12 had fracture on right side and 9 patients on left side

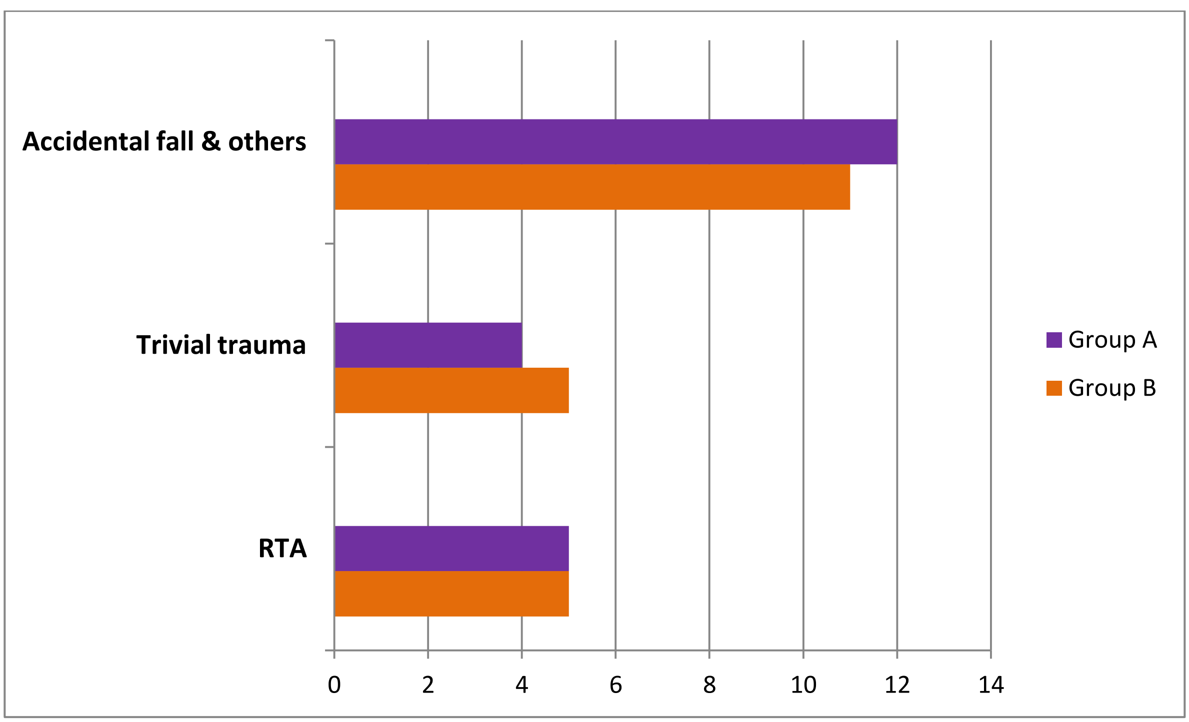
TYPE OF FRACTURE:

CLASSIFICATION	AO			Total	EVANS		Total
Types	A2.1	A2.2	A2.3		IV	V	
Group A	_	12	09	21	12	09	21
Group B	03	12	06	21	14	07	21

In group A, according to AO classification type A2.2 was more common in 12 patients (57.14%) and type A2.3 in 9 patients (42.85%). In Evans classification type IV was more common in 12 patients(57.14%) and type V in 9 patients (42.85%)

In group B, according to AO classification type A2.2 was more common in 12 patients (57.14%), type A2.3 in 6 patients (28.57%) and thye A2.1 in 3 patients (14.28%). In Evans classification type IV was more common in 14 patients(66.66%) and type V in 7 patients (33.33%).

Mode of injury	**Male**		**Female**		**Total**
	Group A	**Group B**	**Group A**	**Group B**	
RTA	03	02	02	03	10
Trivial trauma	01	03	03	02	9
Accidental fall and others	06	06	06	05	23
Total	10	11	11	10	42



No of patients

In group A ,

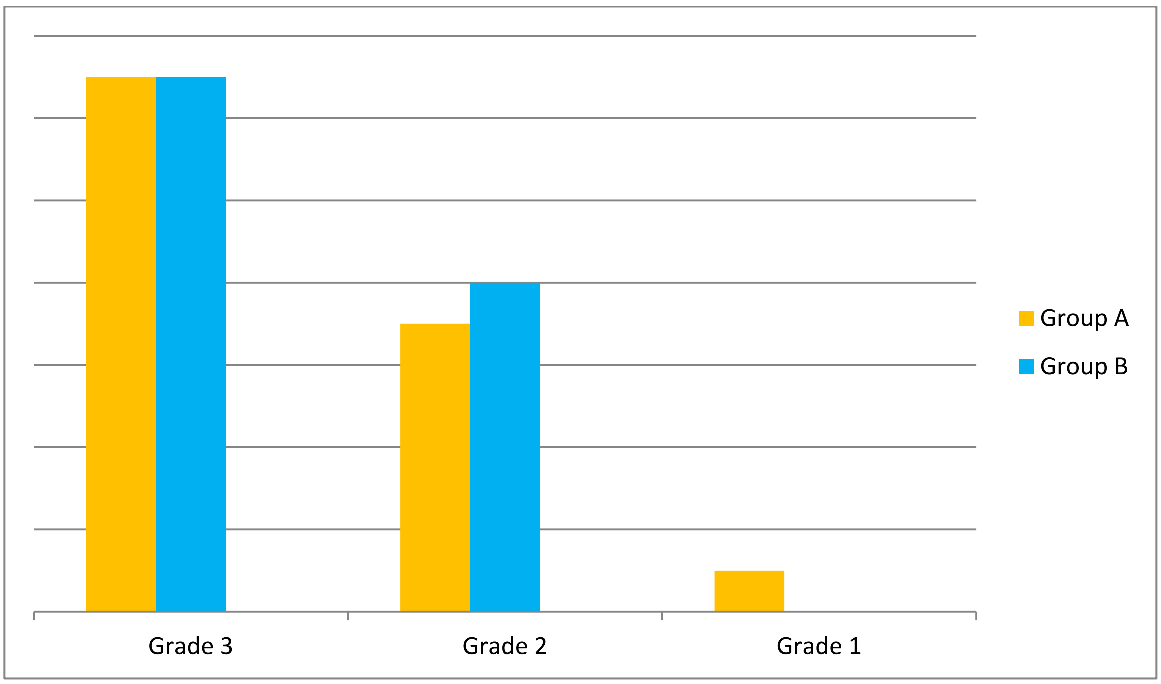
- 12 patients had accidental fall of which there were six male and six female patients
- 5 patients had road traffic accident of which there were three male and two female patients
- 4 patients had trivial trauma of which there were one male and three female patients

In group B,

- 11 patients had accidental fall of which there were six male and five female patients
- 5 patients had road traffic accident of which there were two male and three female patients
- 5 patients had trivial trauma of which there were three male and two female patients

OSTEOPOROSIS EVALUATION :

Singh's index



In both the groups, grade 3 was more common in 13 patients. Seven patients had grade 2 in group A and eight patients in group B. Grade 1 osteoporosis was seen in one patient in group A.

SURGICAL APPROACH :

Group A :

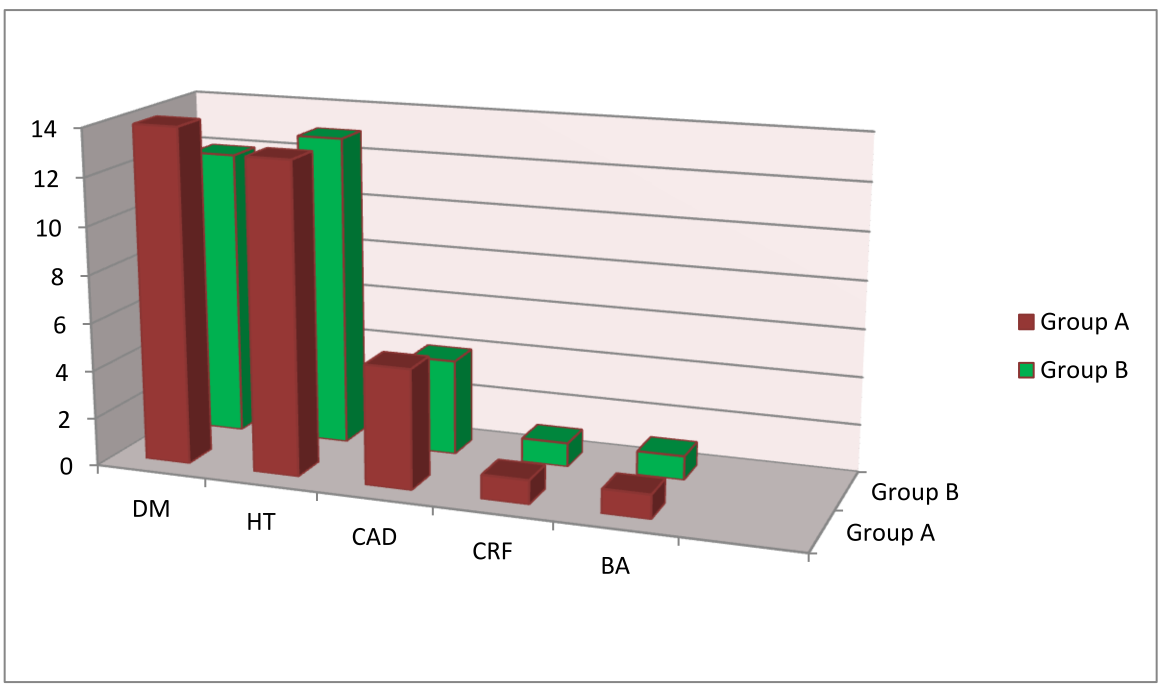
Lateral –15

Posterior -06

Group B

Lateral – 21

COMORBID CONDITIONS:



TIME INTERVAL FROM ADMISSION TO SURGERY :

TIME INTERVAL FROM ADMISSION TO SURGERY(DAYS)	NO OF PATIENTS	
	GROUP A	GROUP B
0-6	05	04
7-12	11	13
13-18	04	03
19-24	01	01

SURGICAL PROCEDURE

PREPARATION OF PATIENT

On the day of the surgery, the skin is prepared using povidone iodine solution and covered with sterile clothes and brought to the theatre where the final preparation is done. Prophylactic antibiotic is given on the table. A third generation cephalosporin is preferred in the dose of 1 gm given Intra Venously.

ANESTHESIA:

Epidural or General anesthesia is usually employed.

POSITION:

The patient is positioned lateral or supine according to the procedure done.

PROCEDURE: (Hemiarthroplasty)

Through the above said approach either posterior or lateral *(fig 1)*, the fracture site is exposed. The fractured fragment along with head *(fig 2)* is removed. Meticulous care was taken to preserve the integrity of the greater trochanter, abductor muscles, and all the vascularized bone fragments. Appropriate head size measured and reaming *(fig 3)* of femoral medullary canal is done.

Trial reduction was performed to determine the neck length, offset and version so that joint stability can be achieved. The femoral canal is lavaged, dried before cementation. The femoral stem with or without graft was impacted gently into position *(fig 4)* until there was good bony coaptation at the inter trochanteric fracture line.

Small calcar bone fragments were reduced over the medial aspect of the femoral stem, for large calcar bone fragments; they were secred by cerclage wires. Other cases needed medial calcar bone reconstruction in the form of U- shaped autograft. The removed head and neck is used to fashion the graft so that it can fit around the medial portion of the femoral stem.

The fractured greater trochanter with the abductor mechanism was stabilized with the main fragment by using tension band wiring technique. The wound was closed in layers with a suction drain.

PROCEDURE: (Dynamic hip screw)

Position: supine

Under fluoroscopic guidance reduction of the fracture is attempted by longitudinal traction initially by external rotation of the leg followed by internal rotation. Lateral incision is made and the vastus lateralis reflected. If reduction not satisfactory in image intensifier, then fracture site is opened. With appropriate angle guide(135 degree) a guide pin is inserted into the femoral neck and head .

After confirming the position of guide pin(center of femoral head) in both AP and lateral planes ,reaming of the femoral neck and head is done . The measured lag screw is then inserted so that the tip is within 1 cm of the subchondral bone .After position of the lag screw in femoral head is confirmed, a four or five holed plate is placed over the screw. The fractured greater trochanter with the abductor mechanism was stabilized with the main fragment by using tension band wiring technique.

INTRA OPERATIVE PICTURE

Fig 1

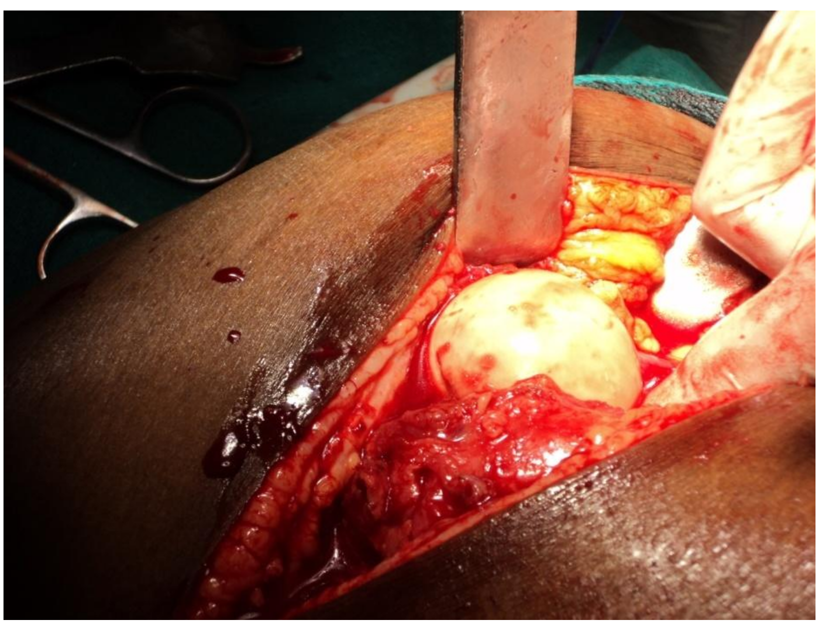


Fig 2

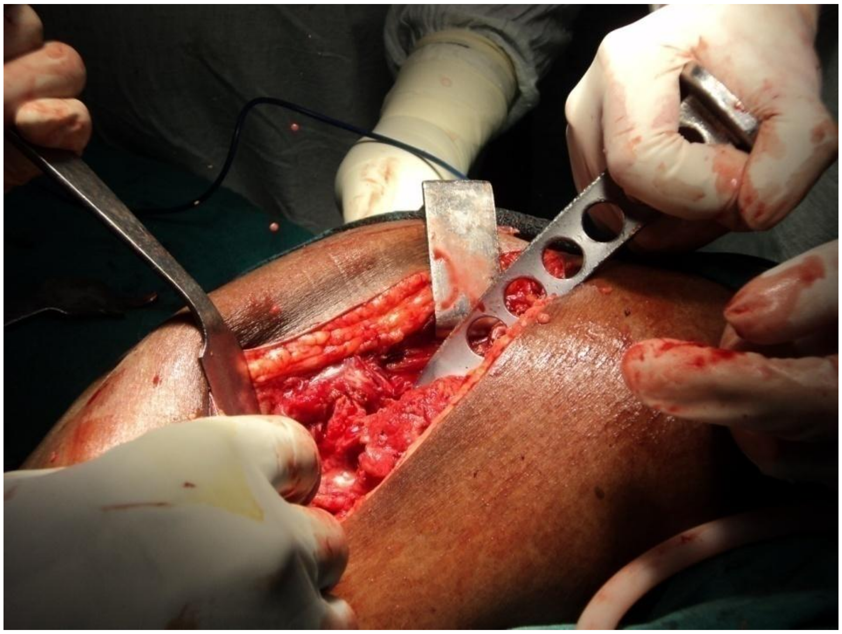


Fig 3

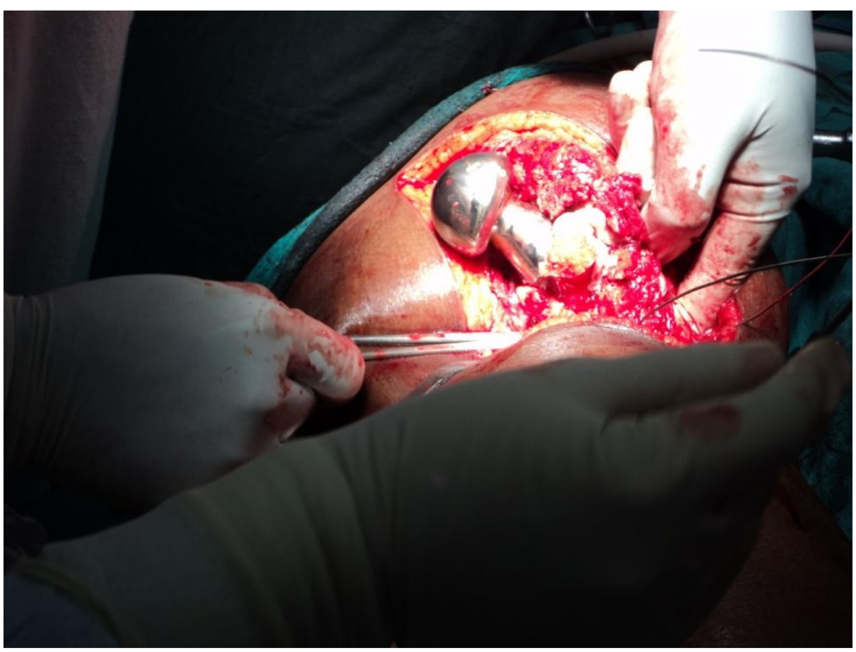


Fig 4

Fig 5

Fig 6

POST OPERATIVE PROTOCOL

Intra venous antibiotic prophylaxis was given routinely to all patients.Intraoperatively and are continued for 5 days and then switched on to oral antibiotics till suture removal. Drain was removed after 48 hours .

Patients in group A were ambulated with tolerated weight bearing on the second postoperative day with the help of a physiotherapist.

Patients in Group B were ambulated non-weight bearing on the second postoperative day and gradually progressed to partial then full weight bearing depending on the quality of bone fixation.

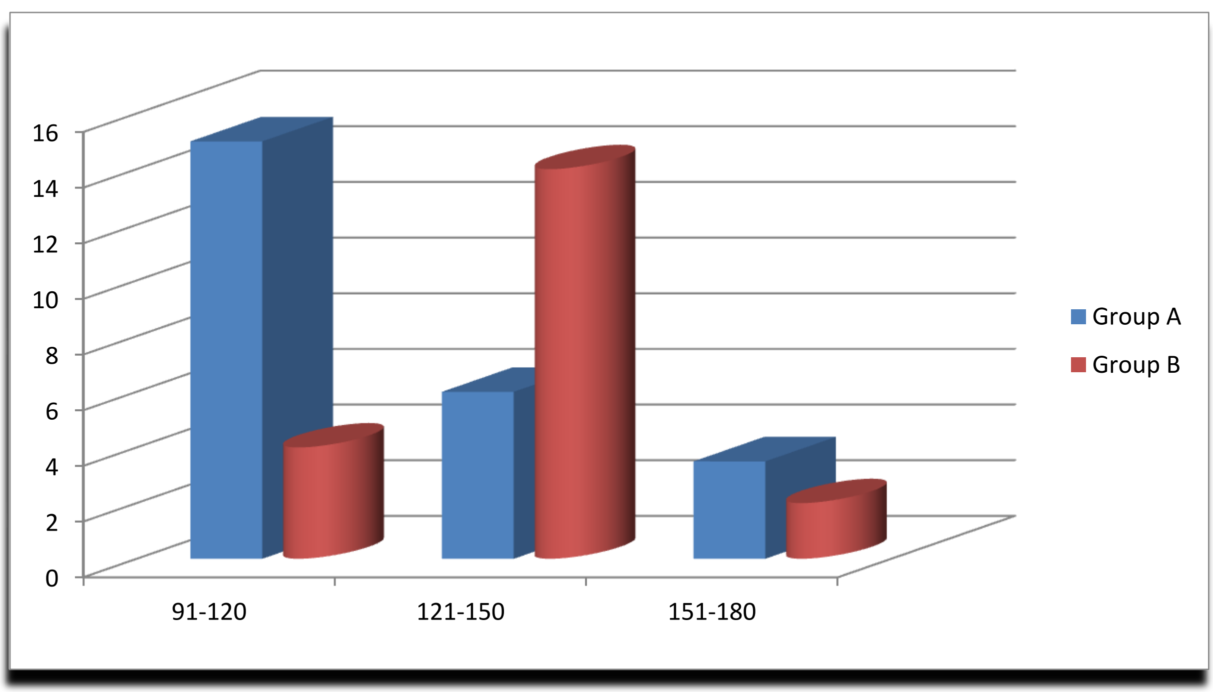
. Suture removal was done on 11^{th} or 12^{th} day.

Patients were followed up monthly for 6 months and later every 6 months. During every follow up patient were assessed clinically using Harris hip score.

INTRA & POSTOPERATIVE DATA :

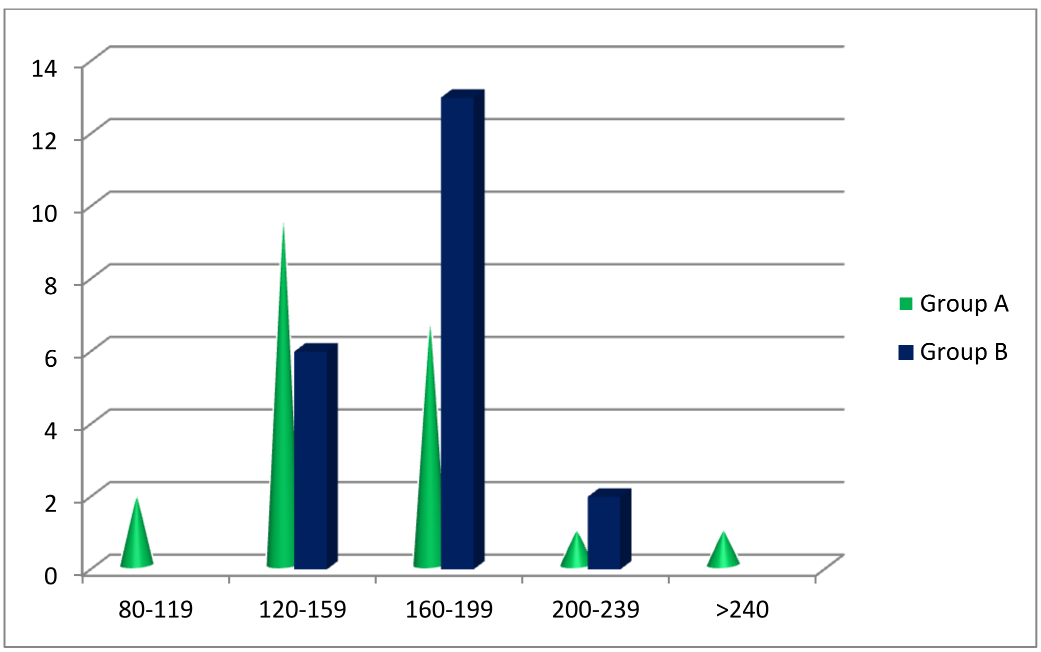
OPERATIVE TIME (mins)	GROUP A (no of patients)	GROUP B (no of patients)
91-120	15	04
121-150	06	14
151-180	_	02

P value : **0.0004**



BLOOD LOSS (ml)	**GROUP A** (no of patients)	**GROUP B** (no of patients)
80-119	02	_
120-159	10	06
160-199	07	13
200-239	01	02
>240	01	_

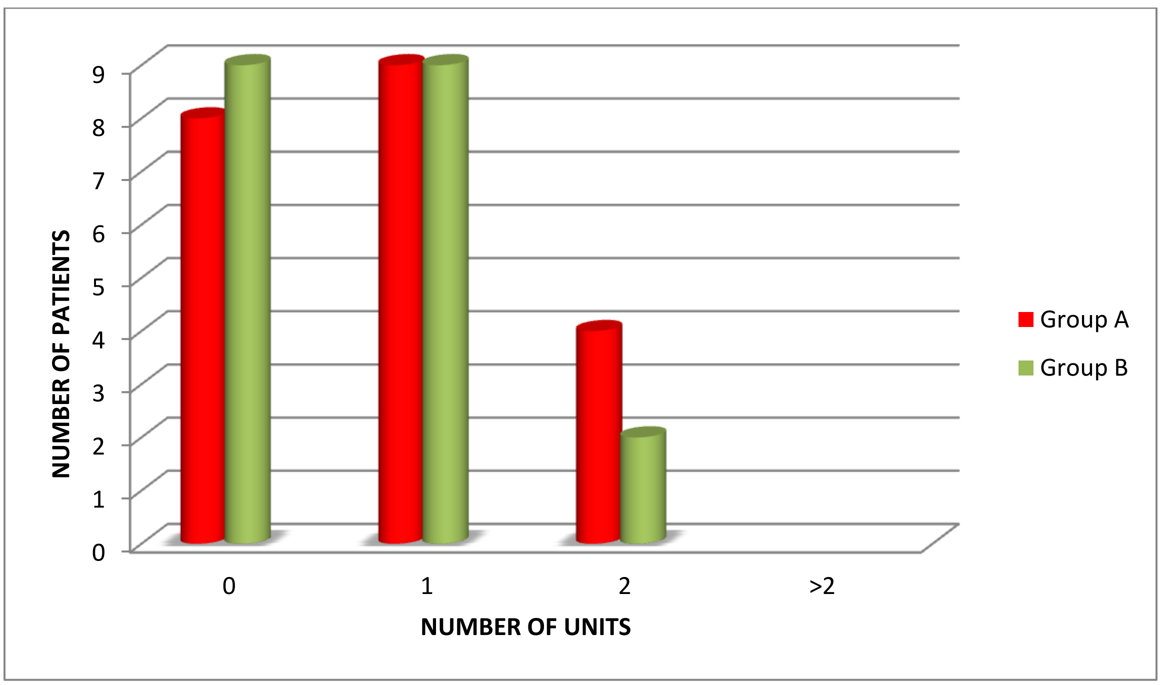
P value : **0.0310**



Blood loss (ml)

BLOOD TRANSFUSION(units)	**GROUP A** (no of patients)	**GROUP B** (no of patients)
0	08	09
1	09	09
2	04	02
>2	_	_

P value : **0.0276**



DURATION OF HOSPITAL STAY(days)	**GROUP A** (no of patients)	**GROUP B** (no of patients)
0-6	12	08
7-12	06	05
13-18	02	05
19-24	01	03

P value : **0.1374**

OBSERVATION

OBSERVATION

This study was conducted at Rajiv Gandhi Government General Hospital and Madras Medical college from May 2010 to December 2012 on 42 elderly osteoporotic patients with unstable intertrochanteric fractures who were divided in to two groups with Group A - Bipolar prosthesis (21 cases) and Group B – DHS (21 cases).

The following observations are made in this study:

1. There was female preponderance in both groups (57 %) in group A when compared to male (52 %) in group B.

2. Right side was more commonly involved in both group A (52.3 %) and group B (57.14 %).

3. Fracture incidence was more common in age group of 60 – 69 years with group A (42.8 %) and group B (57.14 %).

4. The mean age for group A and group B was 71.28 years and 70.09 respectively.

5. Among the fracture distribution in AO classification type A2.2 was more common in both group A (57.14 %) and group B (57.14 %).In Evans classification type IV was more common in both group A (57.14 %) and group B (66.66%).

6. The commonest mode of injury in both the groups was accidental fall and other injuries accounting to 57.14 % in Group A and 52.38 % in Group B.

7. In both groups the most common Singh's index was grade III, 61.90 %in both Group A and Group B.

8. The mean operative time (minutes) was greater in group B (133.66) than in group A (116). P value 0.0004

9. The mean blood loss intraoperatively (ml) was higher in group B (167.52) than in group A (153.57). P value 0.0310

10. The mean blood transfusions (number of units) during hospital stay was greater in group B (1.3) than in group A (1.1). P value 0.0276

11. The mean follow up (months), for group A and group B 11 & 10.7 respectively.

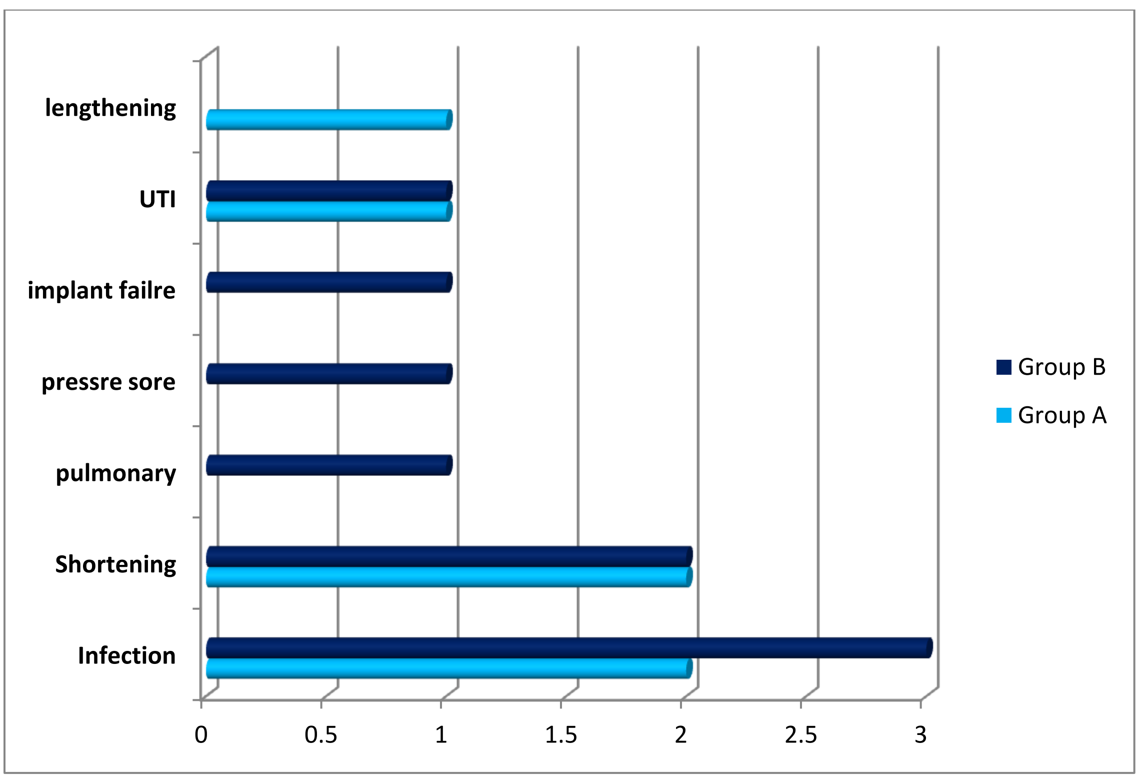
12. Among postoperative complications, pressure sores, pulmonary complications and implant failure were in group B (4.7 %) when compared to group A (0 %). No difference was noted in both the groups in occurrence urinary tract infection.

13. Infection was common in Group B (14.2 %) as compared to group A (9.5 %)

14. In group A, 3 patients had limb length discrepancy, 2 of them had shortening and one had lengthening. One patient was unable to ambulate due to associated medical problems.

15. In group B, 2 patients had shortening, one patient had lag screw cutting out from femoral head, and 1 patient had marked pain during walking.

COMPLICATIONS	GROUP A	GROUP B	TOTAL
Infection	2 (9.5%)	3 (14.2%)	3
Shortening	2 (9.5%)	2 (9.5%)	4
Pulmonary complications	_	1 (4.7%)	1
Pressure sores	_	1 (4.7%)	1
Implant failure	_	1 (4.7%)	1
Urinary tract infection	1 (4.7%)	1 (4.7%)	2
Lengthening	1 (4.7%)	_	1



RESULTS

RESULTS

This study was conducted at Rajiv Gandhi Government General Hospital and Madras Medical college from May 2010 to December 2012 on 42 elderly osteoporotic patients with unstable inter trochanteric fractures who were divided in to two groups with Group A - Bipolar prosthesis (21 cases) and Group B – DHS (21 cases).

Patients were evaluated clinically using Harris hip score during their follow up period.

Based on the Harris Hip Score (HHS), the results were graded a

Excellent	:	$\geq$ 90 points
Good	:	80-89 points
Fair	:	70-79 points
Poor	:	<70 points

HARRIS HIP SCORE

PAIN

- ☐ None or ignores it (44)
- ☐ Slight, occasional, no compromise in activities (40)
- ☐ Mild pain, no effect on average activities, rarely moderate pain with unusual activity; may take aspirin (20)
- ☐ Marked pain, serious limitation of activities (10)
- ☐ Totally disabled, crippled, pain in bed, bed ridden (0)

LIMP

- ☐ None (11)
- ☐ Slight (8)
- ☐ Moderate (5)
- Severe (0)

SUPPORT

- ☐ None (11)
- ☐ Cane for long walks (7)
- ☐ Cane most of the time (5)
- ☐ One crutch (3)
- ☐ Two canes (2)
- ☐ Two crutches (0)
- ☐ Not able to walk (0)

DISTANCE WALKED

- ☐ Unlimited (11)
- ☐ Six blocks (8)
- ☐ Two or three blocks (5)
- ☐ Indoors only (2)
- ☐ Bed and chair (0)

STAIRS

- ☐ Normally without using a railing (4)
- ☐ Normally using a railing (2)
- ☐ In any manner (1)
- ☐ Unable to do stairs (0)

PUT ON SHOES AND SOCKS

- ☐ With ease (4)
- ☐ With difficulty (2)
- ☐ Unable (0)

SITTING:

- ☐ Comfortably in ordinary chair 1 hr (15)
- ☐ On a high chair for one – half hour (3)
- ☐ Unable to sit comfortable in any chair (0)

ENTER PUBLIC TRANSPORTATION

- ☐ Yes
- ☐ No

Flexion contracture (degrees)
Leg length discrepancy (degrees)

ABSENCE OF DEFORMITY (all yes = 4, less than 4 = 0)

- ☐ Less than 30* flexion contracture
- ☐ Less than 10* fixed adduction
- ☐ Less than 10* fixed internal rotation in extension
- ☐ Limb length discrepancy less than 3.2cm
- ☐

RANGE OF MOTION(total degree then check range to obtain score)

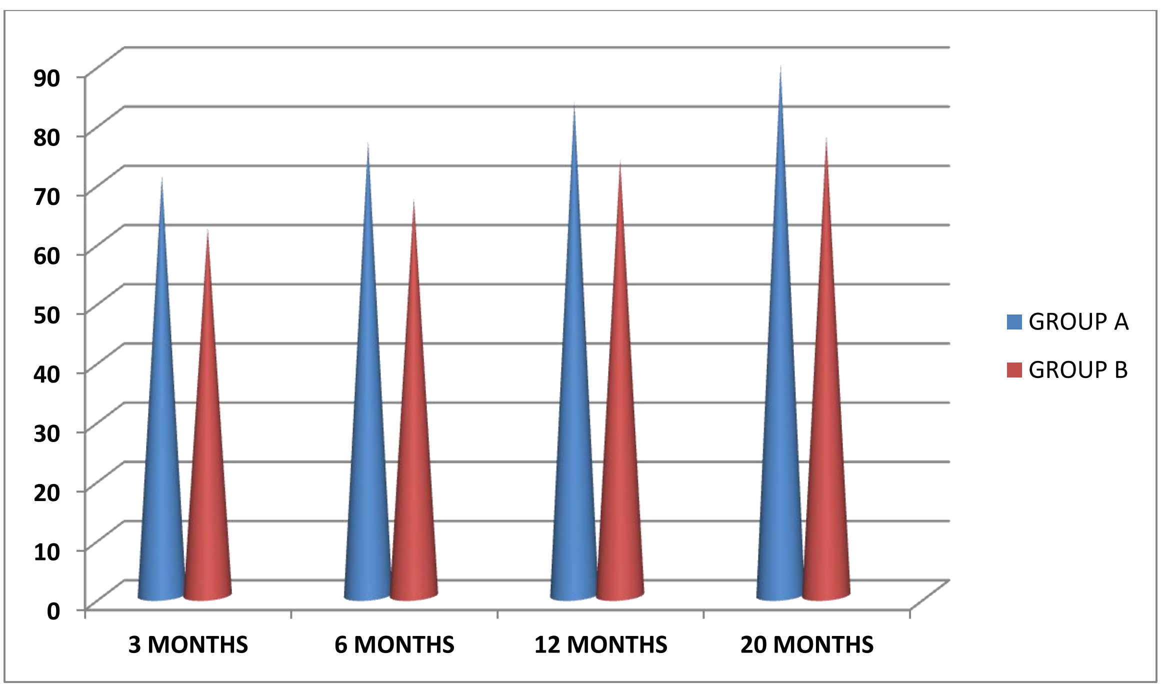
- ☐ Flexion (140*)
- ☐ Abduction (140*)
- ☐ Adduction (40*)
- ☐ External rotation (40*)
- ☐ Internal rotation (40*)

RANGE OF MOTION SCALE

- ☐ 211* - 300* (5)
- ☐ 161* - 210* (4)
- ☐ 101* - 160* (3)
- ☐ 61* - 100* (2)
- ☐ 31* - 60* (1)
- ☐ 0* - 30* (0)

Range of motion score:
Total Harris Hip score:
Readmission to hospital: Yes/No
Date of readmission:
Implant removal date:

FOLLOW UP (months)	**HARRIS HIP SCORE**		**P VALUE**
	GROUP A	**GROUP B**	
3 MONTHS	70.90	62.09	0.00001
6 MONTHS	76.73	67.05	0.00001
12 MONTHS	83.40	73.71	0.002
20 MONTHS	89.66	77.66	0.046



During every follow up ,functional outcome of the patient was analysed.

In Group A ,the harris hip score at three,six,twelve and twenty months are 70.9,76.7,83.4 and 89.6 respectively.

Similarly in Group B,the harris hip score at three,six,twelve and twenty months are 62.09,67.03,73.71 and 77.66 respectively.

ILLUSTRATIVE CASES:

GROUP- A

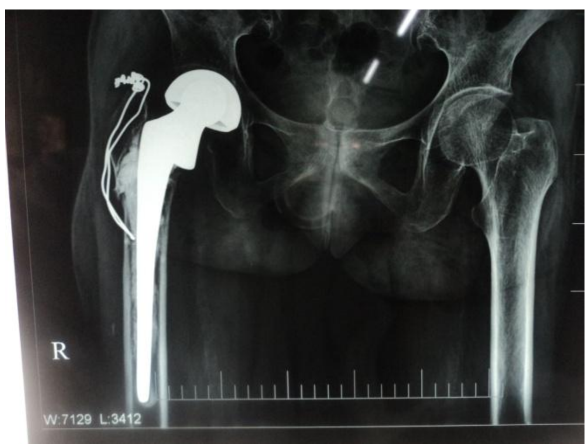
CASE – 1:

Mrs.Jeyalakshmi 65 years female had accidental fall and sustained type IV Evans and AOtype A2.3.

Patient had a Harris hip score of 91 after 21 months follow up.

Pre operative X ray

Post operative X ray



21 months follow up

FOLLOW UP:

Standing

Flexion

Abduction

Adduction

Internal rotation

External rotation

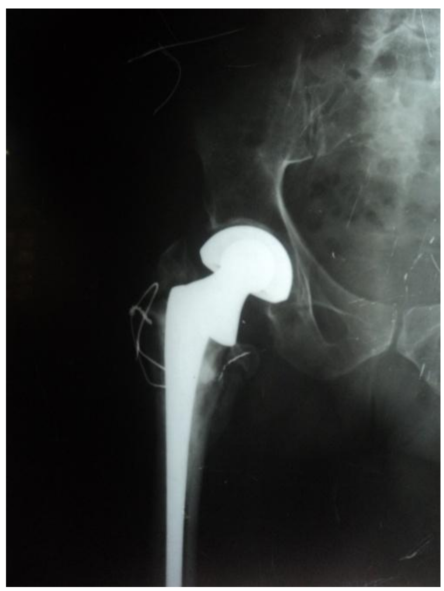
CASE- 2:

Mr.Loganathan 70 years male had accidental fall and sustained type V Evans and AOtype A2.3.

Patient had a Harris hip score of 90 after 21 months follow up.

Pre operative X ray

Post operative X ray



21months follow up

Follow up:

Standing

Flexion

Abduction

Adduction

Internal rotation

External rotation

Group –B

Case -1:

Mr.Uthuraj 75 years male had road traffic accident and sustained type V Evans and AOtype A2.3.

Patient had a Harris hip score of 76 after 9 months follow up

Pre operative X ray

Post operative X ray

9 months follow up

Standing

Flexion

Abduction

Adduction

Internal rotation

External rotation

Case -2:

Mr. Nadhan 68 years male had road traffic accident and sustained type IV Evans and AOtype A2.1.

Patient had a Harris hip score of 78 after 21 months follow up

Pre operative X ray

Post operative X ray

21 months follow up

Follow up:

Standing **Flexion**

Abduction **Adduction**

Internal rotation **External rotation**

DISCUSSION

Intertrochanteric fractures in elderly patients are associated with notable morbidity and mortality. Internal fixation in these patients reduced the mortality associated with these fractures[20], however failure rate is 56%[21,22] and early mobilization is avoided in case of osteoporosis, poor screw fixation and comminution.

The weak and porotic bone in these patients do not provide a firm purchase of screw which leads to early biomechanical failure[23]. As a result femoral head collapses and migrates in to varus and retroversion. This leads to limping due to shortening and decreased abductor muscle lever arm[24].

Another cause for functional disability and pain in these patients is cutting out of the screw from the femoral head. Although the mortality rate is somewhat decreased with internal fixation, the complication rate still ranges from 4 to 50 percent[25].

Primary hemiarthroplasty in these patients provides adequate fixation and early mobilization, alleviates pain and improves function. It also prevents post operative complications such as pneumonia, atelectasis and pressure sores.

In study by Harwin et al{13}, bipolar Bateman-Leinbach prosthesis implanted in fifty eight elderly osteoporotic patients, who had comminuted intertrochanteric fractures, were followed for an average duration of twenty eight months. The average age of the patient in this study was seventy eight years. There were no stem loosening, dislocations or deep infections. Ninety one percentage of patients walked before discharge.

In study by broos et al{26} , bipolar vandeputte prosthesis was implanted in ninety four elderly patients. Results were better with bipolar hemiarthroplasty group with respect to shorter average operating time, lower mortality rate and better functional results.

In study by Rodop et al[27], bipolar leinbach hemiprosthesis was implanted in fifty four elderly patients. There were no cases of stem loosening or dislocations. Harris hip scoring showed good to excellent result in eighty percent of the patients.

In our study, there was female preponderance in both the groups accounting for 57% in group A and 52% in group B. This is due to postmenopausal osteoporosis and lower peak bone mass.

The results in group A were better than group B with respect to blood loss, operative time, perioperative blood transfusion this compares favourably with Sinno K et al[18] where one hundred and two patients participated in the study. Bipolar hemiarthroplasty was done in 48 patients and 54 patients were treated with dynamic hip screw fixation.

The mean operative time is less in group A (116 minutes) than that in group B ,with a P value of 0.0004,which coincides with study by Sinno K et al[18] where it is 112 minutes and P value of 0.0001 in hemiarthroplasty group

The amount of blood loss (mean) is lower in group A (153.5 ml)than in group B (167.5) with P value of 0.03,which is similar to the study by sinno K et al{18} where it is 192 ml in hemiarthroplasty group with P value of 0.005.

The mean blood transfusions (units) is higher in group B (1.3) than in group A (1.1) with P value of 0.02, similar to that study where the mean blood transfusions was greater in internal fixation group (1.9) than in hemiarthroplasty group(1.37),with P value of 0.01

Early mobilization with full weight bearing in group A compared to non weight bearing or partial in group B shows reduction in pulmonary complications(4.7%) and pressure sores(4.7 %) .this in comparable to the study by Grimsurd et al{15} ,where they studied 39 patients treated with bipolar arthroplasty. It allowed early weight bearing and low rate of complications.

There was one case of deep infection and one superficial infection in group A, which comes around 9.5%, whereas in group B 3 patients had infection (14.2%), one of which is deep, which is higher than Sinno K et al{18}where they had 0 % infection in hemiarthroplasty group and 4% in internal fixation group.

There were no cases of dislocation reported in our study. Two patients (9.5%) had shortening postoperatively with 1.5 cm and 2 cm this is better than James et al (11%).One patient had lengthening this was probably due to length of the autograft used in reconstructing the calcar.

The Harris hip score was better in group A than in group B. The Harris hip score at 20 months follow up is significant with P value of 0.04 and were regarded as good in hemiarthroplasty group and fair in internal fixation group, which goes favourably with study by Sino K et al[18] where at 24 months follow up the score was significant in hemiarthroplasty group with P value of 0.0001.

CONCLUSION

CONCLUSION

From our results, we are of the opinion that bipolar hemiarthroplasty may be an efficient option in elderly osteoporotic intertrochanteric fractures. It reduces the potential complications of prolonged immobilization such as pressure sores, pulmonary complications etc by early mobilization. As there is improved function and decreased hospitalization it seems to be cost effective.

Though the results are encouraging in short term, a larger prospective study comparing internal fixation and hemiarthroplasty is needed in long term

Bibliography:

1) Canale & Beaty: *Campbell's Operative Orthopaedics*, 11th ed.

2) *Rockwood & Green's Fractures in Adults*, 6th Edition

3) Bartucci EJ, Gonzalez MH, Cooperman DR. *The effect of adjunctive methylmethacrylate on failures of fixation and function in patients with intertrochanteric fractures and osteoporosis.* **J Bone Joint Surg Am 1985; 67: 1094-1107**

4) Audige L, Hanson B, Swiontkowski MF. *Implant-related complications in the treatment of unstable intertrochanteric fractures : meta-analysis of dynamic screwplate versus dynamic screw-intramedullary nail devices* **Int Orthop 2003 ; 27 : 197-203.**

5) Im GI, Shin YW, Song YJ. *Potentially unstable intertrochanteric fractures*.

   a. **J Orthop Trauma 2005 ; 19 : 5-9.**

6) Rodop O, Kiral A, Kaplan H, Akmaz I. *Primary bipolar hemiprosthesis for unstable intertrochanteric fractures.* **Int Orthop 2002; 26:233-237**

7) Hernigou P, Poignard A, Mathieu G, Cohen G, Manicom O, Filippini P. *Total hip arthroplasty after failure of per- and subtrochanteric fracture fixation in elderly subjects. (French).* **Rev Chir Orthop 2006 ; 92**

8) Green S, Moore T, Proano F. *Bipolar prosthetic replacement for the management of unstable intertrochanteric hip fractures in the elderly*. **ClinOrthop Relat Res 1987; 224:169-177**

9) Waddell, James P. MD, Morton, Jane RN*; The role of total hip replacement in intertrochanteric fractures of femur;* **CORR (429): 49 – 53, Dec 2004.**

10) Tronzo RG*; The use of an endoprosthesis for severely comminuted trochanteric fractures*. **Orthop Clin Nor Am 5; 679 – 681, 1974.**

11) Stern MB, Goldstein PB; *The use of Leinbach prosthesis in intertrochanteric fractures of the hip*. **CORR 128: 325 -331, 1977.**

12) Shin Yoon Kim MD, Yong – Goo Kim, Jun – Kyung Hwang; *Cementless calcar replacement hemiarthroplasty compared with intramedullary fixation of unstable intertrochanteric fractures;* **JBJS (Am) 2005; 87: 2186 -2192.**

13) Harwin SF, Stern RE, Kulick RG; *Primary Bateman Leinbach bipolar prosthetic replacement of the hip in the treatment of unstable intertrochanteric fractures in the elderly;* **Orthopaedics 13: 1131 – 1136, 1990.**

14) Haidukewych GJ, Berry DJ – *Hip arthroplasty for salvage of failed treatment of intertrochanteric hip fractures*; **JBJS (Am): 2003; 85-A(5):899– 904.**

15) Grimmsrud C, Monzon RJ, Richman J, Ries MD; *Cemented hip*

a. arthroplasty with a novel circlage cable technique for unstable

b. *intertrochanteric hip fractures;* **J Arthroplasty: Apr 2005; 20(3): 33743**

16) Jean-Michel laffosse, François molinier *Cementless modular hip arthroplasty as a salvage operation for failed internal fixation of trochanteric fractures in elderly patients* **Acta Orthop. Belg., 2007, 73, 729-736**

17) Parvjeet Singh Gulati, Rakesh Sharma *Comparative study of treatment of intertrochanteric fractures of femur with long-stem bipolar prosthetic replacement versus dynamic hip screw fixation* **Pb Journal of Orthopaedics Vol-XI, No.1, 2009**

18) 18 Sinno K, Sakr M, Girard J, Khatib . *The effectiveness of primary bipolararthroplasty in treatment of unstable intertrochanteric fractures in elderly patients.* **North Am J Med Sci 2010; 2: 561-568.**

19) KH Sancheti, PK *Sancheti primary hemiarthroplasty for unstable intertrochanteric fractures in elderly – a retrospective case serie*s. **Indian J Orthop:October 2010,vol 44,issue 4**

20) White BL ,fisher WD.*Rate of mortality for elderly patients after fracture of hip in the 1980's*.**J bone and joint surgery Am1987;69:1335-40**

21) Kyle RF, Cabanela ME, Russell TA, Swiontkowski MF, Winquist RA, Zuckerman JD, Schmidt AH, Koval KJ. *Fractures of the proximal part of the femur*. **Instr Course Lect 1995; 44:227-253.**

22) Haidukewych GJ, Israel TA, Berry DJ. *Reverse obliquity fractures of the intertrochanteric region of the femur.* **J Bone Joint Surg Am 2001; 83:643-650**

23) Wolfgang GL, Bryant MH, O'neill JP. *Treatment of Intertrochanteric Fracture of the Femur Using Sliding Screw Plate Fixation*. **Clin Orthop 1982; 163: 148-158**

24) Liang YT, Tang PF, Gao YZ, Tao S, Zhang Q, Liang XD, Han G, Cui G, Yang MY. *Clinical research of hemiprosthesis arthroplasty for the treatment ofunstable intertrochanteric fractures in elderly patients.* **Zhonghua Yi Xue Za Zhi. 2005; 85(46):3260-3262.**

25) Levy RN, Siegel M, Sedlin ED, Siffert RS.*Complications of Ender-Pin Fixation in Basicervical, Intertrochanteric, and Subtrochanteric Fractures of the Hip.* **J Bone Joint Surg 1983; 65-A: 66-69.**

26) Broos PL, Rommens PM, Geens VR, Stappaerts KH.

Pertrochanteric fractures in the elderly. Is the Belgian VDP prosthesis the best treatment for unstable fractures with severe comminution? **Acta Chir Belg1991; 91:242-249.**

27) Rodop O, Kiral A, Kaplan H, Akmaz I. *Primary bipolar hemiprosthesis for unstable intertrochanteric fractures.* **Int Orthop 2002; 26:233-237**

ANNEXRE :

PROFORMA

A COMPARATIVE STUDY ON FUNCTIONAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES IN ELDERLY TREATED WITH BIPOLAR HEMIARTHROPLASTY AND DYNAMIC HIP SCREW FIXATION – SHORT TERM PROSPECTIVE ANALYSIS

Case no : ………….. Unit :…………

Name : ……………………………………. Age /Sex :……………..

I.P.no :……….….. Occupation :……………

Address :………………………………………………………….

………………………………………………………….

………………………………………………………….

……………………………Phone :……………………

Date of injury : ………/………/………..

Date of admission : ………/………/………..

Date of surgery : ………/………/………..

Date of discharge : ………./………/………..

Mechanism of injury :

- ☐ Road traffic accident ☐ Assault
- ☐ Accidental fall others : …………………..

☐ Industrial accident

comorbidities :

☐ Diabetes ☐ Tb

☐ Hypertension ☐ cardiovascular disease

☐ asthma ☐ chronic renal failure

General condition :

☐ Conscious

☐ Drowsy

☐ Unconscious

Side involved :

☐ Right

☐ Left

X ray findings :

Singh's index :

Type of fracture :

AO/OTA :

Evans :

Associated other long bone injuries :(yes/No)

If yes………………………………………………………………

………………………………………………………………………………

………………………………………………………………………………

Associated head injury : (yes/ No)

Treatment history :

Treatment elsewhere if any :

……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

Treatment in our institution :

Initial management :

…………………………………………………………………………..

…………………………………………………………………………..

…………………………………………………………………………..

Time interval between initial management &

definitive fixation :…………………

Definitive procedure :

- ◻ Dynamic hip screw
- ◻ Bipolar hemiarthroplasty

Anaesthesia :

Operative notes :

…………………………………………………………………………………
………………………………………………………………………………..……
……………………………………………………………………………..………
…………………………………………………………………………..…………
………………………………………………………………………...……………
……………………………………………………………………..………………
…………………………………………………………………

Calcar reconstruction : (yes/no)

Blood transfusion : (yes/No)

Operating time :

Intraoperative events & difficulties :

………………………………………………………………………………

………………………………………………………………………………..

………………………………………………………………………………..

Anaesthetic complications : (yes / No)

………………………………………………………………………………

Amt of blood loss :

(diff in Hb conc before & after surgery)

Duration of hospital stay :

Amount of Drain :

Post operative immobilization : ………………………………………………

Limb length discrepancy :……………………………………………………..

Other injuries if any & their management :……………………………….

……………………………………………………………………………...

……………………………………………………………………………………..

Wound status

Drain removal after ……………days

Suture removal after ………… days

IV antibiotics …………….days,

Pus C/s (if any) :……………………………………………………………….

………………………………………………………………………………………

Oral antibiotics ………………days

Post operative Mobilization :

- ☐ Non weight bearing
- ☐ Partial weight bearing with walker

Post operative complications :

- ☐ Pulmonary
- ☐ Urinary tract infections
- ☐ Deep vein thrombosis
- ☐ Cardiovascular complications
- ☐ Prosthesis / fixation failure

☐ Wound infection

☐ Pressure sores

Any other :………………………………………………………………

………………………………………………………………………………

Follow up :

Date : No. of Follow up visit :

Month :

Wound Status :

X-Ray :

Harris hip score :

Follow up :

Date : No. of Follow up visit :

Month :

Wound Status :

X-Ray :

Harris hip score :

Follow up :

Date : No. of Follow up visit :

Month :

Wound Status :

X-Ray :

Harris hip score :

Follow up :

Date : No. of Follow up visit :

Month :

Wound Status :

X-Ray :

Harris hip score :

Follow up :

Date : No. of Follow up visit :

Month :

Wound Status :

X-Ray :

Harris hip score :

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	70	F	A2.3	V	L	3	Latera[	Bp	_	16	86	Dm,ht	99	160	01	20	09
2	70	M	A2.3	V	R	3	Lateral	Bp	shortening	21	90	_	122	150	_	06	14
3	61	M	A2.2	IV	R	2	Posterior	Bp	_	12	87	Dm	118	250	02	06	06
4	68	M	A2.1	IV	R	3	Lateral	Dhs	shortening	21	78	DM,HT,CAD	124	220	01	14	10
5	67	M	A2.2	IV	R	3	Lateral	Dhs	_	11	78	DM,HT	136	150	02	08	07
6	82	F	A2.2	V	L	3	Lateral	Bp	UTI	10	86	DM,CAD,HT,CRF	126	180	01	14	11
7	64	M	A2.3	IV	L	3	Lateral	Dhs	_	21	77	_	142	180	_	06	06
8	66	M	A2.3	IV	L	2	Lateral	Bp	_	09	78	HT	98	115	_	07	09
9	81	F	A2.2	IV	L	2	Posterior	Bp	infection	03	71	DM,CAD,HT	106	180	01	22	13
10	65	F	A2.3	V	R	3	Lateral	Bp	shortening	21	91	_	120	140	01	06	19
11	65	M	A2.3	V	L	3	Lateral	Bp	_	08	77	DM,HT	135	135	_	06	09
12	67	M	A2.1	IV	R	3	Lateral	Dhs	_	09	71	_	138	175	02	06	08
13	85	M	A2.2	V	L	3	Lateral	Dhs	Infection, uti	05	65	DM,CAD,HT	122	165	01	21	14
14	67	M	A2.3	V	L	2	Posterior	Bp	_	21	88	_	109	130	_	07	06
15	61	F	A2.2	V	R	3	Lateral	Bp	_	09	76	Dm,ba	110	165	_	07	08
16	72	F	A2.2	IV	R	3	Posterior	Bp	infection	04	69	Dm,ht	132	150	_	18	08
17	68	F	A2.2	IV	R	2	Posterior	Bp	_	10	82	Dm,ht	141	140	01	05	16
18	70	F	A2.2	IV	R	3	Lateral	Bp	_	09	81	ht	103	140	01	06	12
19	68	M	A2.1	IV	R	3	Lateral	Dhs	_	08	69	_	128	130	_	06	07

20	60	F	A2.2	IV	R	3	Lateral	Dhs	_	03	62	BA,HT	116	190	01	12	19
21	66	M	A2.1	IV	L	2	Lateral	Dhs	_	09	79	dm	138	210	02	05	15
22	92	M	A2.2	IV	R	1	Lateral	Bp	_	10	81	DM,CAD,HT	116	155	_	06	05
23	65	F	A2.2	IV	R	2	Lateral	Dhs	Pulmonary comp	03	76	Dm,ht	156	180	01	14	12
24	62	F	A2.3	V	R	2	Lateral	Dhs	Pressure sore	10	82	_	142	185	02	24	09
25	75	M	A2.3	V	R	2	Lateral	Dhs	_	08	76	Dm,ht	158	160	_	14	18
26	70	F	A2.2	IV	L	2	Lateral	Bp	_	07	71	DM,CAD,HT	112	170	01	05	11
27	70	F	A2.3	V	L	3	Lateral	Dhs	_	12	80	Dm,ht,crf	132	190	01	06	07
28	68	m	A2.2	IV	R	2	Lateral	Dhs	_	10	81	ht	122	160	01	05	07
29	72	F	A2.2	V	L	2	Lateral	Dhs	Infection	11	76	Dm,ht	116	170	01	14	06
30	70	f	A2.2	IV	R	3	Lateral	Dhs	Shortening	12	76	DM,CAD,HT	138	138	01	06	10
31	68	F	A2.3	IV	L	3	Lateral	BP	_	09	78	DM	120	145	_	06	07
32	74	M	A2.2	IV	L	3	Lateral	Bp	lengthing	12	85	Dm,ht	118	160	01	08	10
33	68	M	A2.1	IV	R	3	Lateral	Dhs	_	08	69	_	128	130	_	06	07
34	84	m	A2.2	V	R	2	Lateral	Bp	_	14	84	DM,CAD,HT	104	135	_	05	09
35	74	F	A2.2	IV	L	3	Lateral	Dhs	_	11	84	Dm,ht	110	150	01	12	10
36	81	F	A2.3	V	L	2	Lateral	Dhs	Infection	03	58	Dm,ht,cad	150	160	01	21	11
37	71	M	A2.2	IV	R	3	Posterior	Bp	_	10	79	Ht	132	160	01	06	05
38	69	F	A2.2	IV	L	3	Lateral	Dhs	_	16	71	_	165	145	_	06	05
39	73	M	A2.2	IV	R	3	Lateral	Dhs	_	21	78	Dm,ht	124	120	_	12	09

40	76	F	A2.3	V	R	3	Lateral	Bp	_	08	79	Dm	105	110	_	06	07
41	64	F	A2.2	IV	L	3	Lateral	Bp	_	08	80	_	110	155	_	07	05
42	77	F	A2.2	IV	R	2	Lateral	Dhs	_	09	71	_	140	165	01	14	05

A : Serial number

B : Age

C : Sex

D : AO classification

E : EVANS classification

F : side involved

G : Singh's index

H : approach

I : procedure done

J : complications

K : follow up

L : Harris hip score

M : comorbidities

N : operative time (mins)

O : amount of blood loss (ml)

P : blood transfusions (units)

Q : duration of hospital stay post operatively

R : time interval from admission to surgery